Technical Report 1333

Preparing Brigade Combat Team Soldiers for Mission Readiness Through Research on Intangible Psychological Constructs and their Applications Phase II: Measurement and Learning Methods

Steven N. Aude
Heidi Keller-Glaze
Kenneth Nicely
Marissa Shuffler
ICF International

Christopher L. Vowels
U.S. Army Research Institute

February 2014

United States Army Research Institute for the Behavioral and Social Sciences

U.S. Army Research Institute
for the Behavioral and Social Sciences

Department of the Army
Deputy Chief of Staff, G1

Authorized and approved for distribution:

MICHELLE SAMS, Ph.D.
Director

Research accomplished under contract
for the Department of the Army by

ICF International

Technical review by

Allison K. Dyrlund, U.S. Army Research Institute
Peter S. Schaefer, U.S. Army Research Institute

NOTICES

DISTRIBUTION: Primary distribution of this Technical Report has been made by ARI. Address correspondence concerning distribution of reports to: U.S. Army Research Institute for the Behavioral and Social Sciences, ATTN: DAPE-ARI-ZXM, 6000 6th Street, (Bldg 1464 / Mail Stop 5610), Ft. Belvoir, Virginia 22060-5610.

FINAL DISPOSITION: Destroy this Technical Report when it is no longer needed. Do not return it to the U.S. Army Research Institute for the Behavioral and Social Sciences.

NOTE: The findings in this Technical Report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
February 2014	Final	November 2011 – January 2012

4. TITLE AND SUBTITLE

Preparing Brigade Combat Team Soldiers for Mission Readiness Through Research on Intangible Psychological Constructs and their Applications Phase II: Measurement and Learning Methods

5a. CONTRACT NUMBER W5J9CQ-11-C-0009

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER 622785

6. AUTHOR(S)

Steven N. Aude, Heidi Keller-Glaze, Kenneth Nicely, Marissa Shuffler; Christopher L. Vowels

5d. PROJECT NUMBER A790

5e. TASK NUMBER 370

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

ICF Incorporated, LLC
9300 Lee Highway
Fairfax, VA 22031

U.S. Army Research Institute
for the Behavioral and Social Sciences
6000 6th Street (Building 1464 / Mail Stop 5610)
Fort Belvoir, VA 22060-5610

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

U. S. Army Research Institute
for the Behavioral & Social Sciences
6000 6th Street (Building 1464 / Mail Stop 5610)
Fort Belvoir, VA 22060-5610

10. SPONSOR/MONITOR'S ACRONYM(S) ARI

11. SPONSOR/MONITOR'S REPORT NUMBER(S) Technical Report 1333

12. DISTRIBUTION/AVAILABILITY STATEMENT: Distribution Statement A: Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES

Contracting Officer's Representative and Subject Matter Expert: Christopher L. Vowels

14. ABSTRACT

The first report of this research focused on identification of psychological constructs relevant for operational units. This second report covers Phase II of the research and is focused on instrument development and effective learning methods. Both academic and military literary sources were examined and Soldiers and leaders from operational units were interviewed to assist in the accomplishment of Phase II objectives. The literature review and feedback from Soldiers assisted in the design and refinement of measures developed to support assessment of psychological constructs essential for Soldier mission readiness. Key findings included the identification of existing training events where the opportunity exists to train and measure intangibles. Unit events such as combat training center exercises and well-planned field exercises were often identified by Soldiers and leaders where intangibles are likely to be exhibited and provide an opportunity to further train the critical intangibles. See also ARI Technical Report 1336.

15. SUBJECT TERMS

Brigade Combat Team, Hardiness, Will, Grit Initiative

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Dorothy Young
Unclassified	Unclassified	Unclassified	Unlimited Unclassified	100	19b. TELEPHONE NUMBER 703-545-2316

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

Technical Report 1333

Preparing Brigade Combat Team Soldiers for Mission Readiness Through Research on Intangible Psychological Constructs and their Applications Phase II: Measurement and Learning Methods

Steven N. Aude, Heidi Keller-Glaze, Kenneth Nicely, and Marissa Shuffler
ICF International

Christopher L. Vowels
U.S. Army Research Institute

Fort Hood Research Unit
Brian T. Crabb, Chief

U.S. Army Research Institute for the Behavioral and Social Sciences
6000 6th Street, Building 1464
Fort Belvoir, VA 22060

February 2014

ACKNOWLEDGEMENTS

We offer our sincere thanks to the Soldiers and leaders who have provided insights and participated in the research on the present topic. Their efforts continue to assist our understanding of the skills and attributes necessary for Soldier mission readiness.

PREPARING BRIGADE COMBAT TEAM SOLDIERS FOR MISSION READINESS BY WAY OF INTANGIBLE PSYCHOLOGICAL CONSTRUCTS AND THEIR APPLICATIONS PHASE II: MEASURMENT AND LEARNING METHODS

EXECUTIVE SUMMARY

Research Requirement:

This report follows an initial report (Phase I) that focused on the identification of psychological constructs critical for operational units to train prior to deployment. This second report focuses on instrument development as well as the identification of effective learning methods relevant to training intangibles. A further objective was the identification of germane training events that would lend themselves to training and measuring the intangibles critical to operational units.

Procedure:

As in the first phase, both academic and military sources were reviewed to support instrument development and identification of applicable learning methods. Soldiers and leaders were interviewed and completed materials to assist in the initial stages of instrument development. Soldiers were also asked to identify training events most relevant for training and measuring intangibles as well as how current training events lend themselves to developing intangibles.

Findings:

The literature focused on existing measures of the primary intangibles that were identified in Phase I of this research. Those intangibles included: *Initiative, Will, Grit,* and *Hardiness.* Examination of the literature related to measures of psychological constructs revealed primary intangibles consisted of sub-components. For instance, *Hardiness* has been argued to consist of three components: *commitment, control,* and *challenge.* The specificity of this review of available measures informs the follow-on research to develop a construct valid measure encompassing the primary intangibles. Soldiers and leaders identified such training events as combat training center exercises and well-planned field exercises where intangibles are often exhibited and provide an opportunity to further train the critical intangibles.

Utilization and Dissemination of Findings:

The findings from this second phase of research will assist in the development of a valid, field-expedient measure that can be used by a variety of operational units during existing and future training events. The identification and measure of psychological constructs, as they relate to training of existing tangible skills, will enhance individual Soldier development and, thus, overall unit readiness as operational units prepare for deployment.

PREPARING BRIGADE COMBAT TEAM SOLDIERS FOR MISSION READINESS BY WAY OF INTANGIBLE PSYCHOLOGICAL CONSTRUCTS AND THEIR APPLICATIONS PHASE II: MEASURMENT AND LEARNING METHODS

CONTENTS

Page

APPENDICES

TABLES

PREPARING BRIGADE COMBAT TEAM SOLDIERS FOR MISSION READINESS BY WAY OF INTANGIBLE PSYCHOLOGICAL CONSTRUCTS AND THEIR APPLICATIONS PHASE II: MEASURMENT AND LEARNING METHODS

The goal of the Brigade Combat Team (BCT) Preparatory Skill Set research is to develop content valid measures of intangible psychological constructs and identify effective methods for measuring intangibles during training. The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) has used the term *intangible* to describe psychological constructs that contribute to Soldier mission readiness. Soldier mission readiness describes Soldiers' preparedness for all missions (e.g., U.S. based disaster relief, short-term contingency operations, long term deployments, counterinsurgency operations). During Phase I of the research, a literature review and data collection were conducted to identify the most critical intangibles to Soldier mission readiness. The data collection also obtained BCT Soldier and leader assessments of the current state of intangibles training and methods by which intangibles are currently trained.

Phase II of this research focuses on the identification of effective learning methods and measurement tools of intangibles for mission readiness training and methods to adapt research-derived measures for field use. The purpose of the Phase II literature review is to guide the design of measures and an overall training strategy. The Phase II literature review builds on Phase I by reviewing journal articles and technical reports concerning the measurement of the most critical intangibles identified in Phase I (i.e., hardiness, grit, will, and initiative). Additionally, the Phase II literature review examines training methods and measurement implementation using Phase I data collection findings. Lastly, Phase II reviews the literature concerning outcome-based training and education, as well as learning theories, to guide the design and implementation of measures.

Literature Review of Existing Measures for Selected Intangibles

There were four intangibles that were selected in Phase I for further review in Phase II: initiative, will, grit, and hardiness. This section identifies the most effective existing measures used for training these intangibles. Existing measures will be described in detail in this section and recommendations will be made about the suitability and modification of the measures for use in BCT readiness training. If an intangible does not have a reviewable existing measure, doctrine and other relevant literature will be reviewed to identify important concepts and content that could be used in the design of a measure for that intangible.

The following sections examine the intangibles individually and discuss conceptual overlap between the intangibles. The discussion identifies similarities and differences among the intangibles. The goal of this discussion is to address the appropriateness of combining some intangibles into one measure or provide rationale for measuring each intangible individually.

Initiative

The Army defines initiative as "the willingness to act in the absence of orders, when existing orders no longer fit the situation, or when unforeseen opportunities or threats arise" (Department of the Army, 2006a, p. 4-5). Frese, Kring, Soose, and Zempel (1996) stated that initiative: "1) is consistent with the organization's mission, 2) has a long term focus, 3) is goal directed and action oriented, 4) is persistent in the face of barriers and setbacks, and 5) is self starting and proactive" (p. 38). While the Army definition describes the situations of when to apply initiative, the definition from Frese et al. describes the different components of initiative in a general context. Further, Frese et al. have teamed with other researchers to develop multiple reliable and criterion valid measures of initiative.

Frese, Fay, Hilburger, Leng, and Tag (1997) demonstrated the convergent validity of their seven item self-report initiative scale with other operationalizations of initiative (see seven items below).

- I actively attack problems.
- Whenever something goes wrong, I search for a solution immediately.
- Whenever there is a chance to get actively involved, I take it.
- I take initiative immediately even when others don't.
- I use opportunities quickly in order to attain my goals.
- Usually I do more than I am asked to do.
- I am particularly good at realizing ideas.

In addition to finding convergent validity with other measures of initiative, their measure of initiative is also related to components of initiative such as action orientation and overcoming barriers. Both of which are a part of the Army definition of initiative.

Bledow and Frese (2009) further examined this seven item self-report initiative scale in a workplace setting to create a better measure of initiative and address previous concerns over the construct validity of a self-report measure of initiative. Specifically, Frese et al. (1997) first identified that a self-report measure of initiative captures the importance people assign to initiative, rather than measuring how much initiative a person actually possesses through observing initiative behaviors in others. Frese et al. also identified a similar problem with Likert-type measures of initiative. Initiative is defined on the level of observable, situated action. A Likert measure of initiative is problematic because it captures the importance one attaches to initiative, but not actual initiative as displayed through one's behaviors. This research suggests the following design features: 1) do not rely on self report and 2) measure initiative through observed behaviors. These features will improve the construct validity of initiative measures.

As part of Bledow and Frese's (2009) effort to improve on the measurement of initiative, they created three measures: a seven item self-report initiative scale, a seven item supervisor initiative scale, and a situational judgment test (SJT) for initiative. The purpose of Bledow and Frese's study was to design the SJT and demonstrate both its reliability and validity. The SJT displayed an acceptable test-retest reliability (i.e., Pearson correlation) of r=.73. The SJT

demonstrated criterion-related validity as the measure was significantly related to performance r=.48, p<.01. The measure of performance used was a three item measure of overall employee performance developed by Motowidlo and Van Scotter (1994).

Bledow and Frese (2009) also designed a measure of initiative for use by supervisors of employees. The supervisor measure is essentially the same as the self report measure of initiative except the subject of the item changes (e.g., This employee actively attacks problems). The supervisor measure was the most reliable measure α = .91 and the measure with the greatest evidence of criterion-related validity when correlated with measures of performance, r=.72, p<.01.

The brevity of the supervisor measure (i.e., seven items) would make it easy to implement and require fewer resources than a SJT. The supervisor measure of initiative has also been shown to possess sufficient reliability and criterion validity (Bledow & Frese, 2009). Further, because the researchers' operationalization of initiative is consistent with the Army's definition of the construct, the seven item supervisor measure would require only minimal changes for use as an Army training assessment instrument. By applying doctrine, literature reviewed in Phase I and Army subject matter experts the measure could be revised to achieve face validity for BCT commanders, training support personnel, and Soldiers.

Will

The Army defines will as the "inner drive that compels [Soldiers] to keep going even when exhausted, hungry, afraid, cold, and wet" (Department of the Army, 2006b, p. 5-3). Army doctrine effectively defines will and describes its features. However, there were no journal articles that operationalized will in a measure. Therefore, the following discussion, including implications for the present research, is drawn from doctrine.

Army doctrine states that a Soldier's "will in conjunction with self-discipline and confidence helps him or her do what is right; even when it might be difficult" (Department of the Army, 2006b). That quote highlights the importance of self-discipline and confidence and suggests a moderating relationship between will, confidence, and self-discipline. Therefore, a measure of will should include items concerning confidence and self-discipline to account for and understand the relationship between the three intangibles.

Doctrine endorses the idea that, "commitment to beliefs such as Warrior Ethos, Army values, justice, liberty, freedom, and motivation are helpful in developing a Soldier's will" (Department of the Army, 2006b). As Warrior Ethos is described in the literature it seems related to will and also provides insights into the measurement of will. The Army defines Warrior Ethos as a "shared sentiment internal to Soldiers that represents the spirit of the profession of arms" (Department of the Army, 2006b). The following four tenets convey this idea (Department of the Army, 2008):

- I will always place the mission first.
- I will never accept defeat.
- I will never quit.
- I will never leave a fallen comrade.

These tenets are conceptually related to the Army's definition of will. Further, Riccio, Sullivan, Klein, Salter, and Kinnison (2004) and Klein, Salter, Riccio, and Sullivan (2006) examined the components of Warrior Ethos and identified two components that seem to be related to will. The first component is perseverance – "ability to work through adversity, to persevere at all times, and to embody each of the four tenets of Warrior Ethos" (Klein et al., 2006, p. 3). The second component is ability to adapt – "flexibility and smooth reaction to changes in mission and unexpected, often unpleasant, surprises whether from enemy contact, change in weather or terrain, or change in mission from combat to stability and support operations and back" (Klein et al., 2006, p. 3). While Warrior Ethos is comprised of a number of components, each of them appears related to will. The tenets of Warrior Ethos, the definition of Warrior Ethos, and the description of its components provide insight into concepts related to will and should be considered in the design of a measure of will. What remains is to translate the tenets of Warrior Ethos, together with those of confidence and self-discipline, into descriptive statements of observable phenomena in the field.

Grit

Grit is defined as a "perseverance and passion for long-term goals" (Duckworth, Peterson, Matthews, & Kelly, 2007, p. 1087). The distinction between grit and other intangibles is that grit focuses primarily on the achievement of long-term goals. When challenges or adversity are discussed in the literature, the associated length of time for an individual to display grit can occur for months or years. Duckworth stated that passion is a factor related to grit that helps a person sustain interest in their long term goal over time.

In 2007, Duckworth, et al. developed a measure called the grit scale. The grit scale contained two subscales: consistency of interest and perseverance of effort. As part of their validation process, they tested the measure with several different samples (e.g., open survey participation online, undergraduate students, and freshman cadets at West Point). In the West Point study, results indicated that the grit scale was reliable α=.79. Using binary logistic regression Duckworth, et al. demonstrated the grit scale's validity. The grit scale was most effective at predicting the completion of a rigorous summer training course. "Cadets who were a standard deviation higher than average in grit were more than 60% more likely to complete summer training, β=.48, Odds Ratio (*OR*)=.62, p<.001" (Duckworth et al., p. 1095).

In 2009, Duckworth, & Quinn created and validated a shorter version of the original grit scale using another sample of West Point freshman cadets. The scale reliability (α=.77) was acceptable and similar to the original scale and the short scale was more effective at predicting completion of the rigorous summer training course. "Cadets who scored a standard deviation higher than average on the Grit–S were 99% more likely to complete summer training, β=.69, *OR*=1.99, p<.001" (Duckworth & Quinn, 2009, p. 171).

The ARI used the Duckworth, et al. (2007) original self-report grit scale as part of a study that explored the extent to which perseverance contributed to a Soldier completing the Special Forces Assessment and Selection (SFAS) process and being selected for Special Forces (SF) training (Beal, 2010). The author recommended that the grit scale not be used on its own, but in

conjunction with other measures to inform and support recruiting and selection decisions. Beal drew several conclusions concerning the grit scale that are relevant to the present research:

- The grit scale is easy to administer and score.
- The grit scale provides an empirically-valid measure of perseverance that is independent from all other measures.
- The grit scale can be used for professional development as a marker of individual levels of perseverance. (p. 14)

The complete list of items on Duckworth and Quinn's (2009) grit scale is presented below. There are two subscales: consistency of interest and perseverance of effort. The items that are included in the shortened version of the scale are in italics.

Consistency of Interest

- *I often set a goal, but later choose to pursue a different one.*
- *I have been obsessed with a certain idea or project for a short time, but later lost interest.*
- *I have difficulty maintaining my focus on projects that take more than a few months to complete.*
- *New ideas and projects sometimes distract me from previous ones.*
- My interests change from year to year.
- I become interested in new pursuits every few months.

Perseverance of Effort

- *I finish whatever I begin.*
- *Setbacks don't discourage me.*
- *I am diligent.*
- *I am a hard worker.*
- I have achieved a goal that took years of work.
- I have overcome setbacks to conquer an important challenge.

The definition of grit as well as the subscales and items from Duckworth and Quinn's (2009) grit scale should be used as a basis for a measure created to support Army BCT's assessment of grit. The grit scale has been validated with experimental research using multiple samples. And it includes items that measure aspects of a long term persistence that is unique to grit. Only slight changes to words and method of assessment, then, may be needed to adapt this measure of grit for application by an Army BCT.

Hardiness

Hardiness was originally defined as "a personality attribute that reflects the courage and motivation to cope effectively with the stressors of daily life" (Vogt, Rizvi, Shipherd, & Resick, 2008, p. 61). Maddim Matthews, Kelly, Resurreccion, and Villarreal (2010) defined hardiness as "a specific set of attitudes and skills that provide the courage, motivation, and strategies leading to resilience and growth in stressful circumstances" (p. 2). These two definitions are similar in

that both identify hardiness as something expressed through courage and motivation, especially in the presence of stressors.

"In a review of hardiness theory and research, Funk (1992) concludes that both conceptually and psychometrically, the Dispositional Resiliency Scale (DRS) provides the most sound hardiness measure" (Bartone, Roland, Picano, & Williams, 2008, p. 79). The DRS is an established scale that has been studied and used to measure hardiness in multiple military studies (Bartone, 1999; Bartone et al., 2008; Bartone, Ursano, Wright, & Ingraham, 1989). At present, the DRS measure is copyrighted, yet government users are afforded free access to the measure provided they adhere to a user agreement which stipulates that the measure may not be altered. Though the inability to alter the DRS makes it less applicable to the design of an Army-relevant, behavioral measure, the components of the DRS scale provide a previously researched conceptual foundation that measures could be built upon.

Three hardiness components that have been operationalized as reliable subscales of DRS are: commitment, control, and challenge (Bartone, 1999; Hull, Van Treuren, & Virnelli, 1987; Kobasa, 1979; Kobasa, Naddum & Kahn, 1982; Maddi et al., 2002). "Commitment is the extent to which a person is engaged in a variety of life domains, such as family, friends, and work. The control dimension of hardiness represents the extent to which a person believes that he or she is able to control events that happen in his or her life. Challenge reflects the extent to which people generally perceive difficult situations as challenges rather than as threats" (Eschleman & Bowling, 2010, p. 278-279).

While the DRS scale has supportive research validating its effectiveness in measuring hardiness, there are two issues against using it as a measure of hardiness in BCT pre-deployment skills training and assessment. First, the DRS scale cannot be altered. The scale has been shown to be reliable and valid in Army settings, but the inability to tailor the scale creates a limitation should an alteration be deemed necessary. Second, the DRS scale measures hardiness as a personality construct. If hardiness is treated as a personality construct, without associated behaviors, it will be more difficult to observe and may be perceived as not subject to application and development. For example, the DRS items are measuring level of hardiness in the abstract as opposed to measuring hardiness with respect to a specific task. In contrast to DRS operationalization, hardiness could be measured by way of behaviorally based items, situationally and task-based, where observation and developmental feedback are far more concrete and objective. A behavioral instrument would also be more easily applied to training, achieving the project goal of creating a measure for use by an Army BCT.

In summary, the two definitions of hardiness express the construct in terms of courage and motivation, especially in the presence of stressors. Further, the literature shows that commitment, control, and challenge are important components of hardiness. These concepts could serve as a foundation for developing a behaviorally-based assessment instrument conducive to an Army field training environment.

The Relationship between Intangibles

The literature on each of the four intangibles under investigation suggests both similarities and differences among them. The intangibles are all similar in that they emphasize the importance of being action oriented and taking action when necessary. Possessing an action orientation during missions would help when confronting adversity and complexity (which are characteristic of the current operational environment). Thus, action orientation is an important and common part of initiative, grit, will, and hardiness.

The construct of initiative is the most conceptually different from the other three intangibles. The literature suggests the necessity of measuring the following components as a means for measuring initiative: action orientation and whether individuals are proactive or self-starters. An action orientation (as previously discussed) is a point of similarity between the four constructs. Yet Army doctrine also calls out the importance of acting in the absence of orders. Therefore, initiative is distinct from the other intangibles in that it also focuses on *one's own ability to self-start*, proactively address situations before they occur, and use the higher leader's intent to appropriately confront challenges in the absence of orders.

Will, grit, and hardiness are similar in that perseverance is a key concept to each. The relationship between will and perseverance is evident. Grit is long-term perseverance toward the accomplishment of long-term goals. Similar to will, hardiness is perseverance specifically in moments of stress or when resilience is required. Hardiness is somewhat distinct from the other intangibles in that it is typically referred to as a personality factor or a set of attitudes concerning one's willingness to act. Will and grit are more focused on the quality or level of perseverance in one's actions. In this sense, hardiness may be a precursor to will and grit or an effect of having been exposed to situations which require will and grit. For example, hardiness is something that one could hear or observe in a person's attitudes or as a part of their personality; independent of stimuli. Whereas, grit and will are more likely to be observed as one confronts adversity. Therefore, a hardiness measure might best predict perseverance in advance of its display, while measures of grit and will better assess perseverance in-the-moment of its demonstration.

Review of Phase I Findings Related to the Training Environment and Measurement Development

The Phase I literature review, together with the quantitative and qualitative data collection, identified four intangibles that are most critical to Soldier mission readiness (i.e., initiative, will, grit, and hardiness). The following criteria were used to select these intangibles: 1) criticality to Soldier mission readiness, 2) expressed participant need for new training, 3) the feasibility of measurement and training, and 4) the importance placed on these intangibles in the literature and doctrine. The findings that are most relevant to the present discussion of intangible training and measurement are listed below. This data was analyzed for high frequency themes according to how often it was mentioned by participating BCT Soldiers and their leaders.

One of the most frequent themes from Phase I focus group findings was that there is not enough time for training. Soldiers pointed to increased operations tempo (OPTEMPO) and the

shortened Army Forces Generation (ARFORGEN) cycle as obstacles to training. In addition to these concerns, Soldiers said that they are always receiving more to do from headquarters which also requires time. These findings establish significant time constraints that recommend against the development of any measure that would be seen as an additional requirement. Therefore, the measurements should be designed to be applied in existing training exercises with simple implementation, minimal additions to training requirements, and obvious value-added for the time required to employ them.

The most frequently mentioned desired training features identified during the Phase I data collection were difficult/rigorous/challenging training, experiential training, realistic training, train using repetition, incorporate uncertainty into training, and that field exercises should train Soldiers to deal with stress. Additionally, Soldiers identified what training environments are most effective for training intangibles. The training features that were most frequently mentioned were those associated with effective training environments in general: challenging, stressful, and realistic (e.g., National Training Center (NTC) or large field exercises). Soldiers noted that training needs to be challenging, but not impossible. Training needs to push Soldiers just beyond their limit so they realize that they can create new limits and go beyond what they thought they were capable of. Yet at the same time, training should not be so difficult as to invite continual failure.

Training environments that did not use the desired training features (e.g., classroom training) were seen as less effective or ineffective at training intangibles. However, there were instances where Soldiers indicated that classroom training was a prerequisite for more advanced training. Additionally, these Soldiers noted that a crawl, walk, run method was necessary for training. Similarly, doctrine says "that leaders give subordinates complex tasks to gradually develop the will necessary to take on more difficult tasks" (Department of the Army, 2006b). Therefore, intangibles are displayed and best evaluated in the most challenging training environments. Yet the effective development of intangibles most likely begins well before Soldier exposure to the most demanding training environments. Initial practice of tasks under normal operating conditions helps Soldiers gain necessary skills and confidence before more challenging training conditions are imposed on them.

The rigors, challenges, and adversities that exist in difficult training events bring out the intangibles. The initial research identified primary intangibles relevant for the U.S. Army Soldier. The research described in this report examines training events and other methods where intangibles are likely expressed. Future research efforts could then explore *if* and *how* a Soldier's exhibition of intangibles, a demonstration of their technical and tactical skills, and the training environment are linked. For these reasons a measure of an intangible needs to also measure Soldier training performance and training outcomes. Linking intangibles to training performance and outcomes in one measure provides the ability to examine their relationship and provide more accurate and enhanced feedback. For example, training aptitude could be distinguished from intangibles in instances where a Solider does possess the intangibles but lacks the basic knowledge, skills, and abilities to perform training. Or it could be the case that Soldiers need to possess the requisite knowledge, skills, and abilities in order to demonstrate the intangibles.

Review of Training Methods and Learning Theories

Outcome Based Training and Education (OBT&E)

Introduction to OBT&E. The OBT&E is actually a philosophy of training and education rather than a specific training method or learning theory. It has a learner-centered focus and could be argued to be more holistic than traditional training and educational approaches, in that it "enables the student to master a subject, apply the subject appropriately, and synthesize it with other knowledge" (McDaniel, 2009). Other unique aspects of OBT&E are discussed in the next section.

Outcome-based training and education has been identified as a promising approach to learning. The Joint Warfighting Center (JWFC) Training Development Group (TDG) Analysis Division has stated its support of OBT&E as a potentially effective means of obtaining the joint training outcome goal of developing "joint capability-knowledgeable problem solvers and those willing and able to take initiative" (JWFC, 2009, p.1). Recent work by the Army's Asymmetric Warfare Group (AWG) suggests that outcome based training is needed for today's changing environment (Ferguson, 2008). The Army has begun to embrace these techniques institutionally with the incorporation of OBT&E into the Army Reconnaissance Course (ARC) at Fort Knox (Perry & McEnery, 2009), the Infantry Captains Career Course (ICCC) at Fort Benning (Haskins, 2006), and the Initial Entry Training (IET) programs at both Fort Benning and Fort Jackson (Tice, 2008).

Distinguishing features. The primary distinguishing feature of OBT&E is implied by its name. The effectiveness of training in OBT&E is assessed in terms of outcomes, whereas much of current training in the Army is assessed in terms of meeting a standard. Proponents of OBT&E argue that this allows for improved performance over standards-based training (McDaniel, 2009). One argument is that when given a standard as a training goal, students are unlikely to exceed that standard; they train until just meeting the standard. The OBT&E, though, encourages mastery because no minimum standard is specified.

Another distinguishing feature of OBT&E is that it facilitates mastery and generalization of skills and knowledge attained. Typically in OBT&E, learners master fundamental skills and principles in a low-stress environment then practice the skills and apply the knowledge in increasingly stressful, complex environments. Emphasis is placed on learning principles, which then permits the learner to adapt their skills and apply them to a variety of situations, not just the situations they experienced in training. Thus, some argue, OBT&E "promotes the development of adaptive thinking, individual initiative, collective agility, and most importantly, confidence…" (McDaniel, 2009).

The OBT&E requires training developers to take a broader view of the goals of training, in contrast to standards-based training. Training developers must identify the objectives of the training in terms of holistic outcomes instead of discrete standards. This is not to say that standards have no place in OBT&E; standards can still be used, but they are not used as the sole measure of performance.

While not a learning theory, as pointed out above, OBT&E is an approach to learning and is therefore related to learning theories. This relationship is discussed in the next section.

Relationship to other learning theories. As a philosophy of training and education, OBT&E provides the context in which other learning theories can be operationalized and training methods can be used. Thus, OBT&E is conducive to many learning theories and training methods with the requirement of measuring performance in terms of outcomes. For example, cognitive learning theories can be used in conjunction with a OBT&E approach as long as performance is measured by outcomes rather than meeting standards. Specific learning theories including cognitive learning theory, which we may use within the context of OBT&E, are discussed below.

Learning Theories

To discern the best approaches to training intangible skills, it is important to understand the approaches to learning that may be most appropriate for these types of skills. The complex nature of intangible skills requires the learner to process information about the skill and how it should be used in appropriate situations. Drawing upon theories of advanced learning can therefore help better design training that will facilitate learning. The learning theories that were reviewed are classified as learner-centered approaches. Also, the theories have been linked to deep learning (Curnow, et al., 2006).

A learner centered approach is defined as an approach to learning that is consistent with the 14 learner-centered principles. The 14 learner-centered principles were identified for a 1990 Presidential task force, revised in 1997, and prepared by the American Psychological Association's (APA) Board of Educational Affairs (BEA). The 14 principles "focus on psychological factors that are primarily internal to and under the control of the learner rather than conditioned habits or physiological factors. However, the principles also attempt to acknowledge external environment or contextual factors that interact with these internal factors" (APABEA, 1997, p. 3). The 14 learner centered principles are provided below.

1. Nature of the learning process - The learning of complex subject matter is most effective when it is an intentional process of constructing meaning from information and experience.
2. Goals of the learning process - The successful learner, over time and with support and instructional guidance, can create meaningful, coherent representations of knowledge.
3. Construction of knowledge - The successful learner can link new information with existing knowledge in meaningful ways.
4. Strategic thinking - The successful learner can create and use a repertoire of thinking and reasoning strategies to achieve complex learning goals.
5. Thinking about thinking - Higher order strategies for selecting and monitoring mental operations facilitate creative and critical thinking.
6. Context of learning - Learning is influenced by environmental factors, including culture, technology, and instructional practices.

7. Motivational and emotional influences on learning - What and how much is learned is influenced by the motivation. Motivation to learn, in turn, is influenced by the individual's emotional states, beliefs, interests and goals, and habits of thinking.
8. Intrinsic motivation to learn - The learner's creativity, higher order thinking, and natural curiosity all contribute to motivation to learn. Intrinsic motivation is stimulated by tasks of optimal novelty and difficulty, relevant to personal interests, and providing for personal choice and control.
9. Effects of motivation on effort - Acquisition of complex knowledge and skills requires extended learner effort and guided practice. Without learners' motivation to learn, the willingness to exert this effort is unlikely without coercion.
10. Developmental influences on learning - As individuals develop, there are different opportunities and constraints for learning. Learning is most effective when differential development within and across physical, intellectual, emotional, and social domains is taken into account.
11. Social influences on learning - Learning is influenced by social interactions, interpersonal relations, and communication with others.
12. Individual differences in learning - Learners have different strategies, approaches, and capabilities for learning that are a function of prior experience and heredity.
13. Learning and diversity - Learning is most effective when differences in learners' linguistic, cultural, and social backgrounds are taken into account.
14. Standards and assessment - Setting appropriately high and challenging standards and assessing the learner as well as learning progress -- including diagnostic, process, and outcome assessment -- are integral parts of the learning process. (APABEA, 1997, p. 4-7).

Deep learning involves the acquisition of higher order skills through the relation of new concepts to existing experience, the distinguishing of new ideas from existing knowledge, and the critical evaluation and determination of key themes and concepts (Draper, 2009; Entwistle & Ramsden, 1983; Fink, 2003; Ramsden, 1992). Deep learning is a relevant concept for intangible skill development as it engages students on multiple levels in order to create knowledge that is meaningful and applicable to real world situations (Fink, 2003). Given the complex nature of intangible skills, having a deep understanding of when and how to use such skills is critical. Deep learning also serves as the foundation for other aspects necessary for learning complex skills, such as developing effective knowledge structures and enabling the transfer of training to operational environments (Ford, Smith, Weissbein, Gully, & Salas, 1998).

There are many theories available that can provide a means for understanding how to best train the intangible skills. Specifically, advanced learning theories can provide a key foundation for developing this training as they target the development of advanced or complex skills (Curnow, et al., 2006). We conducted an extensive review of advanced learning theories from the training, education, and cognition literatures relevant to the development of learning and intangible skills. These resulting set of theories includes:

- Cognitive learning strategies, metacognitive strategies, scaffolding, and cognitive tutoring;
- Collaborative learning and virtual learning groups;
- Constructivism/learner-centered education;
- Experiential activities;
- Learning to learn/self-regulation training;
- Self-explanation strategy training; and
- Cognitive flexibility theory.

While each of these theories takes a slightly different approach to learning, the centralized theme around each is the emphasis on learner-centered education. These theories are not mutually exclusive of one another, but instead many overlap in terms of the specific issues they address. This can be beneficial from a training perspective in that the theories can be combined to address issues relevant to intangible skill development, including knowledge building, learning through experience, and interacting with other learners. The following provides a brief summary of each theory and how it may be applicable to the training of intangible skills.

Cognitive Learning Strategies, Metacognitive Strategies, Scaffolding, and Cognitive Tutoring. Given the complex nature of intangible skills, it may be necessary to provide learning support systems to individuals trying to master them. These types of systems are defined as those that provide tools, aids, and other guidance in order to offer a sense of structure meant to foster learning. The purpose of cognitive and metacognitive learning strategies, scaffolding, and cognitive tutoring is to do exactly this, albeit through slightly different approaches (Curnow, et al., 2006). Learning strategies focuses on how individuals can best process information, whereas scaffolding and cognitive tutoring describe tools to support learning. Specifically, cognitive learning strategies provide assistance in helping students acquire, attain, retain, and retrieve information (Van Dijk & Kintsch, 1983). These strategies include approaches such as rehearsing information to be learned, using mnemonic devices to organize and store information, or constructing mental representations (Pressley & Woloshyn, 1995). Metacognitive learning strategies are similar, but slightly different in that they focus on teaching students how to learn (Bell & Kozlowski, 2010). These strategies involve developing students' ability to self-regulate and self-monitor their thoughts, actions, and processing of information in order to maximize learning opportunities (Parush, Hamm, & Shtub, 2002).

Other learning tools that can support knowledge and skill acquisition include scaffolding and cognitive tutoring. Scaffolding involves providing a temporary support system to the learner, with pieces of the support being removed as the learner becomes more advanced (Cuevas, Fiore, & Oser, 2002). This could involve instructors providing more hands on guidance early on in a course and then slowly removing this support, or it could be some other support mechanism that is later removed. The final tool, cognitive tutoring, offers a form of learning through guidance. Tutors, whether they are human instructors or technology based tutoring systems, provide guidance such that learners receive feedback to let them know how they are doing throughout the learning process (Merrill, Riser, Merrill, & Lands, 1995). Tutors already have a mastery of the knowledge domain and are therefore able to recognize when the learner has made or is about to make an error.

Together, these four different types of learning tools can provide a much needed support system by which students can gain a clearer understanding and practical use of complex skills. They have all been linked empirically to improvements in learning and development, especially for deep learning. Furthermore, combining these different tools can be of great benefit. For example, Ringenberg and VanLehn (2006) explored the use of an intelligent tutoring system that incorporated elements of scaffolding to develop problem solving skills in students. They found that this approach significantly improved the deep learning of problem solving skills. Therefore, it is expected that these types of tools may also enhance the learning of intangible skills.

Scaffolding and cognitive tutoring are most useful as methods for training intangible skills during difficult and challenging training events. The similarity between scaffolding and cognitive tutoring is the use of an instructor, tutor, or knowledgeable support system. Scaffolding would be an ideal training method for getting trainers to take Soldiers to the point where they have reached their limits and then move them beyond those limits. Trainers could provide a scaffold to get Soldiers to their maximum levels of initiative, will, grit, and hardiness. Further, trainers could develop Soldiers by either removing support or pushing Soldiers to even higher levels of achievement concerning the intangible skills.

Collaborative Learning and Virtual Learning Groups. Collaborative learning environments are those where individuals work together to make sense of a concept (McCarthey & McMahon, 1992). The basis of collaborative learning is built upon the idea that learning is in fact a social process whereby individuals can learn through working with one another (Bonk & Cunningham, 1998). During collaborative learning, students work together, share information and opinions on the topic being learned, clarify concepts, and work towards joint problem solving. This interaction helps learners develop a deeper understanding of a concept in that it provides an opportunity for them to build knowledge based not only on their own comprehension, but also through the additive knowledge of others (Shuffler & Goodwin, 2008).

Given the recent rise in technology and technology-based learning systems, many of these collaborative learning activities are now carried out through virtual means (Orvis, Wisher, Bonk, & Olson, 2002). Although these groups can be challenging due to a lowered degree of social presence (Avolio & Kahai, 2003), they also offer the key advantage of allowing learners to participate in collaborative learning experiences across space and time. Furthermore, there have been many instructional tools developed to reduce the potential problems with online learning, such as virtual learning environments that enable synchronous (e.g., instant messaging and teleconferencing) and asynchronous (e.g., email and discussion boards) information exchange, provide opportunities for practice and feedback, and facilitate social interactions (Mueller & Strohmeier, 2010). Given the already demanding pace of training for Soldiers, providing opportunities to participate in virtual learning groups may allow for the deeper learning of skills in a convenient setting that is accessible at all times and locations.

Collaborative learning is suited for the development of intangible skills because Soldiers' initiative, will, grit, and hardiness are likely to be tested in collaborative learning environments such as field exercises or combat training center (CTC). The communication and shared learning experience that comes from collaborative learning environments would help Soldiers to develop intangible skills. Soldiers would learn how to build upon their individual abilities from their

fellow Soldiers through the shared hardships experienced in collaborative training. Further, Soldiers could learn how their demonstration of intangible skills can influence and affect their fellow Soldiers. Virtual learning tools such as the use of mobile devices could enhance the communication and shared experience of Soldiers in complex and challenging collaborative training environments.

Constructivism/Learner-Centered Education. According to constructivist and learner-centered models of instruction, learners are more apt to gain knowledge and skills when they have some degree of control over the learning experience (Stefanov, Stoyanov, & Nikolov, 1998). Traditional training approaches tend to treat learners as passive recipients of information where proceduralized knowledge acquisition is the goal (Bell & Kozlowski, 2010). However, learner-centered models shift the focus to the learner in order to ensure that the learner is actively involved in the process. This enables the learner to construct knowledge over time in a way that becomes easy to recall. Surgeons are often used as an example of constructive learning in that they gain a foundational knowledge in the classroom upon which they then must draw from their experiences to supplement and deepen their knowledge base (Abernathy & Hamm, 1995). Eventually, they become experts because they utilize many different techniques and approaches to learning information that best fits their needs; with each new experience providing additional knowledge.

One example of this type of learner-centered model is active learning (Kozlowski, Mullins, Weissbein, Brown, & Bell, 2001). This approach is designed to stimulate and shape different cognitive, emotional, motivational, and emotion self-regulatory processes such that learners can effectively focus attention, direct effort, and manage emotions during learning experiences. This approach differs from traditional perspectives of training in that it focuses on the internal versus the external regulation of learning (Iran-Nejad, 1990). This means that active learning puts the responsibility upon the learner to engage in the learning process and make learning decisions. The benefit of active learning is that it is especially helpful for developing complex skills that are not easily trained such as adaptability. Indeed, recent empirical research has found that the incorporation of active learning into training designs has resulted in a deep level understanding of adaptive expertise as well as adaptive transfer of different types of skills (Bell & Kozlowski, 2008; DeRouin, Fritzsche, & Salas, 2005; Ivancic & Hesketh, 2000). Given this success in training other intangible skills, it is likely that active learning may also be of benefit to the intangible skills presented here.

Soldiers' participation in field exercises and NTC training is active, meaning that Soldiers are fully in control of their behavior in a simulated exercise or problem. Thus, when Soldiers are required to call upon their grit, will, hardiness, and initiative in various simulated environments they can practice utilizing different techniques and approaches that will give them expert access to the intangible skills in real life situations.

Experiential Activities. Experiential learning opportunities were highlighted previously as one of the approaches recommended during the Phase I focus groups. From a theoretical perspective, experiential activities are those activities which individuals gain knowledge through active reflection of experiences. Kolb (1984) posited that experiential activities stimulate knowledge gain and learning through the refinement of existing concepts and formation of new

ones via sense-making. He argued that the basic assumptions of experiential learning were that learning: 1) is a process, not an outcome; 2) derives from experience; 3) requires an individual to resolve dialectically opposed demands; 4) is holistic and integrative; 5) requires interplay between a person and environment; and 6) results in knowledge creation. Experiential learning can be simulation based in a specific training setting, or it can be through on-the-job experiences. The benefit of this type of learning is that it can occur constantly throughout the learner's career as long as individuals take time to reflect upon their experiences (McCauley, Moxley, & Van Velsor, 1998). This may prove to be a particularly useful approach to developing intangible skills for Soldiers as it does not require much additional time in the training cycle, but instead can be incorporated throughout everyday experiences.

Learning to Learn/Self-Regulation Training. Learning to learn, or self-regulated learning, is the process by which learners take charge of identifying and correcting learning problems (Wisher & Graesser, 2007). This is a metacognitive approach in that it involves the higher level act of recognizing fluctuations in one's own learning and reconciling these differences in order to maximize a learning experience (Kanfer & Heggestad, 1999). Learning to learn is built upon the underlying belief that individuals are able to learn how to regulate their own cognition, motivation, or behavior (Bell & Kozlowski, 2008). Furthermore, through these processes of regulation, learners should be able to achieve educational or developmental goals (Zimmerman, 1989). Training that involves self-regulation or learning to learn not only addresses learning objectives tied to skill development but also incorporates learning strategies, structure of knowledge and application of knowledge and learning strategies as outcomes.

Self-regulated learning is a reflective process which may be challenging for some learners to develop. Indeed, empirical research has resulted in mixed findings regarding the effectiveness of formal attempts to train self-regulation (Hattie, Biggs, & Purdie, 1996; Hofer & Yu, 2003; Simpson, Hynd, Nist, & Burrell, 1997). However, it has been found to be effective for ensuring adaptive transfer (Bell & Kozlowski, 2008) and improving emotion control (Keith & Frese, 2005). Furthermore, self-regulation training tends to work best when it combines teaching the range of cognitive components of learning with a range of motivational components (Hofer & Yu, 2003). From the perspective of training intangible skills, incorporating self-regulation to improve emotion control during the training process may be beneficial as trying to become proficient at these complex skills may lead to frustrations. The measurement of intangible skills will help Soldiers to identify developmental needs to learn how to regulate their motivation and behavior. Following an administration of the measures, the awareness of developmental needs can be used to regulate and modify behavior in future training events and other life experiences.

Self-Explanation Strategy Training. The premise behind self-explanation strategy training is that explaining examples is a critical aspect of the learning process (VanLehn, Jones, & Chi, 1992). In this type of training, individuals are taught to explain examples to themselves while processing the content to be learned. Research has illustrated that those who use this technique tend to have higher performance when asked to apply the knowledge learned. Furthermore, the use of self-explanation strategy training to support learning has been effective both when learners are directly applying the rules they have acquired (i.e., near transfer), as well as when rules are applied more flexibly (i.e., far transfer; Atkinson, Renkl, & Merrill, 2003). There are many ways in which learners can walk through examples. This can include having

students take notes (Trafton & Trickett, 2001) or explaining out loud their though processes (VanLehn et al., 1992). It can also include having tutors initiate questions that students can use as a starting point (Chi, 1996) as well as having students justify the steps they took in solving example problems (Atkinson et al., 2003).

One possible method of self-explanation that may be particularly useful for training intangible skills is the "what if" method, also known as the "crystal ball" technique (Cohen, 1998). This is an explanatory approach where learners walk through conclusions they have drawn about an event. Individuals must first imagine that the conclusion they have drawn and believe to be correct is actually wrong. They must then reflect on why it might be wrong and how they may need to adjust their thinking processes to account for all possible circumstances. This type of self-explanation has been successfully used to develop critical thinking skills in Soldiers, and, therefore, may have relevance with other complex skills (Cohen, et al., 1998).

A self-explanation strategy, particularly the "what if" method, is an approach that Soldiers could use to examine and help them explain their own behavior concerning the intangible skills. This approach could be introduced to Soldiers following an event that required demonstration of the intangible skills. Soldiers could be asked to reflect on what went well and the conclusions that can be drawn with focus on the intangible skills.

Cognitive Flexibility Theory. The concept of cognitive flexibility theory (CFT) is centered upon the idea that individuals may gain extensive knowledge during training, but they also need to be able to apply this knowledge in situations that may be very different from those experienced in training (Bell & Kozlowski, 2010; Spiro, Feltovich, Jacobson, & Coulson, 1992). In traditional approaches to training, individuals learn information in a relatively linear fashion, organized into logical categories or frameworks. However, it may not always be the case that a learner will need to recall this information in the exact same way. Cognitive flexibility theory emphasizes the conceptual interrelatedness of different ideas and how they may be interconnected (Jonassen, 2007).

According to this approach, knowledge may need to be stored and retrieved in ill-defined domains where multiple perspectives or schemas may be involved. For example, in medicine there may be many different ways to treat a patient for an illness; medical students must therefore be prepared to understand and react to the fact that there is not always a single "right" answer. Thus, a key guiding principle of cognitive flexibility theory is that information may need to come from multiple sources and perspectives in order to ensure that learners will be able to think flexibly when required (Spiro, Feltovich, & Coulson, 2004). Given that intangible skills are those that may be applied in a wide range of situations and complex circumstances beyond the training environment, cognitive flexibility appears to be a critical element to the training process. Soldiers should be introduced to a variety of challenging and complex training environments to increase their cognitive flexibility concerning the intangible skills. During these training events, the measurement of intangible skills will create a source of information that Soldiers can learn from to improve performance in real life situations.

Learning Theory Summary. The learner centered theories are applicable to the implementation strategy for the measures. Each of the learning theories discussed provides

specific strategies that will increase the effectiveness of intangible measures. Based on the measures that are developed, multiple learning theories can be applied within an OBT&E context to increase the effectiveness of training.

Literature Review Summary

This report examined the literature and existing data to guide the design of intangible measures and a strategy for their implementation. Concerning the design of intangible measures, we examined the literature, relevant doctrine, and existing measures to identify reliable and valid measures and provide potential recommendations for improving upon them. Regarding the development of a strategy for measurement implementation, data collected in Phase I was reviewed and literature on training and learning theories were examined to identify useful training methods. The summaries for these topics are below.

Intangible Measurement

The literature provided examples of reliable and valid measures for all of the intangibles except will. The doctrine on will and the literature on Warrior Ethos provided examples of relevant content such as perseverance and the ability to adapt. This literature serves as an adequate foundation for the design of a content valid measure of will.

Several measures of initiative were identified (e.g., supervisory, self-report, and SJT). Research demonstrated that a supervisor's measure of employee initiative and an SJT measure were most effective at accurately assessing initiative. However, these measures of initiative were not developed for Army personnel. Therefore, these instruments must be adapted for Army use by adding Army-specific language and additional questions where necessary. It is beneficial that the literature and its supporting validation research provide for multiple measures of initiative.

There is one measure of grit with two versions (i.e., short and long) that are both reliable and valid. These measures of grit incorporated two subscales: consistency of interest and perseverance of effort. Both measures had been researched in an Army environment and demonstrated the ability to predict training completion for West Point cadets. Researchers reported that the grit measure was easy to use and score and that it was useful for professional development. Researchers also suggested that the grit measures be used alongside other instruments. Therefore, the grit measure may be a good candidate for combining its measurement with that of other intangibles (e.g., will). Further, this research demonstrates the ability of the grit measures to accurately measure grit as part of a battery of measures.

The literature on hardiness suggests that it is a personality trait or a set of attitudes. Therefore, the reviewed measure of hardiness is typical of a personality test (e.g., items that assess attitudes and beliefs rather than behaviors). This type of measure is less applicable to a field training environment where the assessment of observable behaviors is preferred. The literature identified three components of hardiness: commitment, control, and challenge. These components can be used to design new instruments. However, questions remain concerning the

type of test (e.g., personality or behavioral) and who would rate the test (e.g., self, supervisor, or training support personnel).

The definition of initiative and its measures distinguishes it from the other intangibles because of the focus on self-starting behaviors. Hardiness is distinct from grit and will in that it is seen as a set of attitudes or a personality trait. For these reasons, these intangibles may not be combined suitably with the other intangibles, but a measure could still be designed for them separately.

The intangibles that would seem most easily combined are will and grit. The overlap in definitions and the focus on perseverance suggests they are similar. The one distinction is that grit concerns long-term achievements more than will. Existing grit measures have demonstrated reliability and validity, whereas, no existing measures of will were identified. Items could be designed using doctrine on will together with Warrior Ethos and added on to either grit measure (i.e., short or long).

Training and Learning Methods

Findings from Phase I data are relevant to creating a strategy for implementation. The high OPTEMPO forces a training environment that is constrained by resources and time. Thus, there is limited time to train the tangible skills and even less time to focus on training relevant intangibles. Therefore intangible measurement and training should be designed to occur during other training events (e.g., field exercises or gunnery). Soldiers suggested that training needs to be challenging. Soldiers also identified that training is an iterative process and if practice is not provided under normal conditions, task accomplishment under more difficult training conditions will be less effective.

The OBT&E has been indicated as an effective training philosophy for implementing training on the intangibles. The OBT&E is a learner centered philosophy and will allow for the incorporation of multiple learning theories into training. The important design recommendation from the literature on OBT&E is that training needs to focus on evaluating outcomes rather than standards. This is complemented by Phase I findings which suggest a crawl, walk, run approach to training where the run stage consists of ambiguous, uncertain, and rigorous training environments that challenge Soldiers to practice and apply previous training to accomplish a mission rather than achieve a standard.

The learning theories can be applied to develop an effective implementation strategy. The learner-centered approach of the reviewed learning theories is compatible with the philosophy of OBT&E. Each theory can be used to build effective implementation features into training. Which theories are leveraged depends upon the measures that are developed and also the training resources that are available. Some examples of how the learning theories could be applied to an implementation strategy are discussed below.

Cognitive flexibility theory and experiential training are learning strategies that attend to the stressful, complex, and difficult operational environment faced by Soldiers. These theories emphasize the importance of highly realistic training environments where Soldiers must react to

uncertainty and apply their knowledge, skills, and abilities in innovative ways to find creative solutions.

Learning theories such as scaffolding, cognitive tutoring, and collaborative learning emphasize the importance of a support system to learning. These theories should be incorporated into implementation strategy by identifying the support systems that are readily available during training. These support systems could be used to build Soldier confidence as conditions are made more difficult and task/mission accomplishment becomes more difficult.

Soldiers noted the importance of training that pushes them to their breaking point. Following training, self-explanation theory may be useful in getting Soldiers to identify their breaking point, why it is there, and how they can overcome it. This learning theory could be combined with other learning theories such as collaborative learning or cognitive tutoring so that a Soldier's explanation was heard by a support system capable of knowing when and when not to intervene.

The literature review of intangibles training methods and their measures served to inform the creation of protocols (questionnaire, interview, and focus group) for this second phase of data collection. One outcome desired of this data collection was to learn more about how to effectively implement measures of intangibles into BCT readiness training. Another outcome was to build on the Phase II literature review and identify performance indicators for the intangibles. The combination of knowledge gained from achieving both of these data collection outcomes is important to the development of content valid measures of select intangible psychological constructs.

Method

Research Questions

The data collection sought answers to the following research questions:

1. What training events are most effective in training the intangibles?
2. What training methods and learning theories are used in existing exercises, venues, and activities?
3. What training features are used in existing exercises, venues, and activities?
4. How can measurement of intangibles be accomplished and adapted to the field?
5. What measurement characteristics are most appropriate for measuring intangibles?
6. What are the training performance indicators for the selected intangibles?

Sample

Data collection occurred at Fort Hood with Soldiers from a BCT. Data collection sessions consisted of four focus groups and 14 interviews resulting in a total sample size of 47 active duty Army personnel. The job position characteristics of the sample were selected to provide representation from various rank levels with backgrounds in training (e.g., training plans, design, execution, and experience conducting training). Consequently, a focus group protocol

was used to collect data from separate groups of company commanders, first sergeants, platoon sergeants, and platoon leaders. And an interview protocol was used to collect data from battalion and brigade commanders, command sergeant majors, operations officer (S3), executive officers (XO), training Noncommissioned Officer (NCO), and operations NCOs. Table 1 displays the breakdown of the sample by rank cohort.

Table 1**.**

Sample Size of Interviews and Focus Groups by Rank Cohort

Rank Cohort	Sample Size
Field grade officers (lieutenant colonels and majors)	8
Company grade officers (captains and lieutenants)	17
Senior NCOs (sergeant majors, first sergeants, master sergeants and sergeants first class)	17
Junior NCOs (staff sergeants and sergeants)	2
No rank indicated	3

Procedures

All Soldiers were first given a Privacy Act Statement and Informed Consent Statement before the session. In this report, the term Soldiers is used to refer to all participants (e.g., enlisted, NCOs, and officers). Across all data collection sessions no one elected to not participate. Next, Soldiers filled out a questionnaire (Appendix A). The questionnaire consisted of items in four different content domains: training methods, training features, rater and time concerns, and intangibles. Each item on the questionnaire used a 5 point scale (1 = Strongly Disagree to 5 = Strongly Agree) asking respondents to rate the extent to which likely training events provides for a given training method, training feature, rater and time concerns, and the measurement of specific intangibles. For example, an item from the training methods content domain asked respondents the extent to which they agreed or disagreed that a given training event (e.g., field exercise, gunnery, etc.) provided realism. The rated training events included:

- Field Exercise;
- NTC (National Training Center);
- Gunnery;
- Resiliency Training;
- Combat Life-saver Training/Medical Simulation Training Center (MSTC) Training/Trauma Lane;
- Ranger School/Mungadai Training (physical fitness events combined with combat readiness tasks executed individually or in small teams);
- Basic Training Problem Solving Exercises;
- Classroom Training;
- Power Point Training; and
- On the Job Training.

The training events listed above as well as some of the items for each of the questionnaire content domains was created based on research conducted previously. For example, the items in

the training feature domain were identified in Phase I of this research as features that are known to contribute to effective training. Another example of how the questionnaire was built on previous findings is that each item in the training method domain was associated with its respective learning theories identified from the Phase II literature review. Table 2 displays the association between questionnaire items and learning theories.

Table 2.

Questionnaire Item and Learning Theory Association

Item	Questionnaire Item	Learning Theory	Source
1	provides practice and experience in training	Experiential activities	Kolb (1984)
2	provides realism during training	Experiential activities	Kolb (1984)
3	provides multiple, different opportunities to apply knowledge and skills	Cognitive flexibility theory	Spiro, Feltovich, Jacobson, & Coulson (1992)
4	offers a collaborative or team-based training experience	Collaborative learning and virtual learning groups	McCarthey & McMahon (1992)
5	allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training	Self-explanation strategy training	VanLehn, Jones, & Chi (1992)
6	provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills	Cognitive learning strategies, scaffolding, and cognitive tutoring	Cuevas, Fiore, & Oser (2002)
7	has an instructor or leader who is able to guide and challenge development during training	Cognitive learning strategies, scaffolding, and cognitive tutoring	Merrill, Riser, & Merrill (1995)
8	involves understanding, problem solving, and making sense of new events rather than the memorization of facts	Constructivism/learner-centered education	Bell & Kozlowski (2010)
9	allows Soldiers to critique their performance and assess their ability to learn during training	Learning to learn training	Wisher & Graesser (2007)

Note. The identified source is a representative source and others exist.

After Soldiers completed the questionnaire, they were asked a series of open- ended questions in either a focus group or interview setting. Appendix B contains a complete list of all questions and probes employed during interview and focus group sessions. Interviews were conducted by the interviewer either in person or on the phone. Phone interviews were digitally recorded while in person interviews were manually transcribed by a recorder. Complete transcripts were created for all interview and focus group sessions.

Data Analysis

Quantitative analysis. Means and standard deviations were calculated for all items on the questionnaire. Training event mean scores were created for each item. For example, the mean scores derived from rating the realism of a given training event were likewise calculated for all training events (e.g., field exercises and NTC). By way of a comparison of these mean scores, it can be determined which training events Soldiers believed to be better at providing realism, offering a collaborative environment, etc. This method of analysis was used for each of the questionnaire content domains (i.e., training methods, training features, rater and time concerns, and intangibles). Thus, the results demonstrate which training methods and training features are most appropriate for the various training events, what rater and time concerns are present in each of the training events, and which training environment is most effective for the measurement of intangibles. The means and standard deviations for each of the content domains are presented in Appendices C, D, E, and F.

Qualitative analysis. Qualitative analysis of interview and focus group transcripts consisted of coding each session for themes. There were two desired outcomes of qualitative data analysis: 1) identify the highest frequency themes and 2) identify quotes that could provide context or add insight to the questionnaire findings. To adequately capture the importance or emphasis Soldiers placed on a given theme, two categories of themes were identified. Themes were categorized under research questions and only the most frequent themes are discussed. Similar to the Phase I, analysis of the qualitative interview and focus group data was accomplished using a three step process.

Step I. Facilitators and recorders from the data collection read through each transcript and identified a tentative list of themes. They then came to consensus on themes for each research question. A master list of themes was created and disseminated to all coders. A single, representative transcript was then selected and every coder used the master theme list to code its comments (see Appendix G). Discrepancies in theme coding among coders were discussed and issues were resolved prior to coding all remaining transcripts. In so doing, it was confirmed that coders were consistently coding transcript comments.

Step II. Eighteen (18) total transcripts (14 interview transcripts and four focus group transcripts) were then coded by two coders. Each transcript was coded twice which allowed for coding accuracy checks in the Step III to follow. Coders coded themes at the session level; when a theme was mentioned once in a session, it was reported once in the results. Similarly, when a theme was mentioned five times in a session it was reported only once in the results. This allowed for the calculation of theme counts among sessions while controlling for method issues that could result from analyzing interview and focus group data together. For example, this method of calculating theme counts does not give greater weight to focus groups where multiple Soldiers are likely to mention the same theme. It also mitigates the repetitive mention of a theme by a Soldier in the same session. Consequently, this session level method of calculating themes ensures the magnitude of themes is not inflated or overstated in the results.

To facilitate capturing in depth descriptions of Soldier comments, each coder highlighted the accompanying narrative of a given coded comment. This procedure allowed analysts to

include statements representative of a particular theme. Consequently, themes are reported in a way that provides description of its richness and depth.

Step III. Each transcript was coded twice by two different coders. Following coding, the two coders discussed the themes they identified and the respective text from the transcripts that they highlighted. A total of two 4-hour accuracy sessions took place among coders where they reviewed the transcript that they had both coded. During each session, one coder created a new document for each transcript that included all of the agreed upon themes from both coders. In the accuracy sessions, coders found, discussed, and resolved differences, thus providing for greater accuracy throughout the coding process.

Results and Findings

Intangible Measurement

Soldiers were asked to identify the effectiveness of each of the different training events for measuring the intangibles: initiative, will, grit, and hardiness. The means of Soldiers' responses were calculated for each of the 10 training events and for each of the four intangibles (Appendix F). A sample item is "NTC is an excellent environment to measure Soldier's initiative." The intangibles were evaluated separately. For each intangible, mean scores on the various training events were ranked to determine the most effective and least effective training event.

The Soldiers tended to rate the same events as effective at measuring each of the intangibles. For example, the most effective training events, from highest to lowest, across all of the intangibles were Ranger School, the NTC, field exercises, on-the-job training (OJT), and gunnery. Similarly, the least effective training events for measuring intangibles were classroom training and PowerPoint instruction. A frequent theme (61% of sessions) provided insight into the distinction between the highest and lowest rated events. A quote representative of this theme is "Baseline knowledge is more appropriate for some training events, and others are more appropriate for training complex tasks, including intangibles." For example, one Soldier said "I see them (i.e., training events) as a stair step approach to training where you are teaching individual skills and then you throw in different events of problem solving building up to collective training with gunnery, to field exercises, to NTC which is the ultimate and best training for a couple different reasons." Thus, Soldiers seem to indicate that collective training, involving a myriad of tasks and challenges, is a more effective training environment for measuring intangibles than individual knowledge and skill acquisition training events.

Learning Methods

Soldiers were asked to identify their level of agreement concerning the learning methods evident in a given training event. For example, "NTC provides practice and experience in training." The results below discuss Soldiers' responses for each of the learning methods and the effectiveness of each training event at providing them.

Experiential learning. Soldiers were asked whether the various training events provided practice and experience in training. Results indicated that the top three training events for providing practice and experience were NTC (*M*=4.52, *SD*=.81), field exercises (*M*=4.47, *SD*=.66), and OJT (*M*=4.35, *SD*=.64). Soldiers frequently (50% of sessions) mentioned practice and experience as an effective training method. Soldiers' comments in interview and focus group sessions described the effectiveness of these events and demonstrated some of the specific methods used to provide experiential training.

Concerning the effectiveness of field exercises at providing experiential training on the intangibles, one Soldier said "Putting a new Soldier in that environment (field exercises) for 2 weeks, making them function, by the end of that they are integrated and had a test in all of these intangibles. After two weeks, you know your guys (there is nowhere to hide). At the end of that, you know individual strengths and weaknesses." Another Soldier said "Need to put combat arms guys out in their element – that is what they joined the Army to do. The only way to learn to walk through the woods is to walk through the woods. Everything else is sit around and talk about it – except OJT." Lastly one Soldier discussed his sequential method for providing experiences for his Soldiers, "Put Soldiers up front and force them to do something – make them do the leader's job." Another Soldier said "You start with individual skills, then gunnery, then field exercises, and then NTC environment."

Learning under realistic conditions. Soldiers were asked whether the various training events provided for realistic training. The three highest rated events in terms of providing realism during training were the NTC (*M*=4.48, *SD*=.78), Ranger School/Mungadai training (*M*=4.20, *SD*=.86), and field exercises (*M*=4.11, *SD*=.69). Notably, the mean scores for realism were lower than the other training methods. This may indicate a gap between what Soldiers know real world military missions are like and how effective training events are at replicating that realism. Realism in training was also the most frequently mentioned (78% of sessions) qualitative theme from among the training methods. In focus groups and interviews, Soldiers said that providing realism in training was an important and necessary training method. One Soldier described the importance of realism to the training of basic skills "The realism with regard to NTC, field exercises, and gunnery – those are core fundamentals at how we get good at our profession." Another Soldier mentioned the importance of realism and experiential training prior to deployment, "Mostly realism and practice experience in training. Because I believe the first time you are tested should not be in combat. You should find out how strong you are prior to having boots on the ground. If you find out what kind of man you are before you are tested for real…the more real the training that you have and the more you practice, the better it would be." Thus realistic training, training that resembles as close as possible the conditions Soldiers will face in executing their missions is a very important ingredient to learning. That this learning method or condition was rated lower than others may indicate improvement in its application is needed.

Demonstrating cognitive flexibility. Soldiers were asked whether the various training events provided for multiple, different opportunities to apply knowledge and skills. The three highest rated events were NTC (*M*=4.52, *SD*=.84), field exercises (*M*=4.38, *SD*=4.33) and Ranger School/Mungadai training (*M*=4.33, *SD*=.72). In the interview and focus group sessions this was a frequent theme (50% of sessions). Soldiers cited this training method in reference to

NTC or field exercises. For example, one Soldier said "The other events like field exercises etc. bring more than one piece of training – it is variety and different each time." Another Soldier said that there was value in this training method being used alongside repetition in training "Multiple opportunities with repetition. The NTC and gunnery are what I'm familiar with – it improves a unit faster; more dollar for your investment."

Collaborative learning. Soldiers were asked whether the various training events offer a collaborative or team-based training experience. The three highest rated events for offering a collaborative or team-based training experience were NTC (*M*=4.63, *SD*=.74), field exercises (*M*=4.38, *SD*=.58), and Ranger School/Mungadai training (*M*=4.27, *SD*=1.10). In focus group sessions, this training method was frequently mentioned (50% of sessions). One Soldier said "NTC was great – like a field exercise but more encompassing – had to rely on others to do their job." Further, one Soldier described the effectiveness of NTC and field exercises at building team models "I like the teamwork part of it – team based training builds your team models – and that is where you create standard operating procedures (SOP) and find out who knows what and who you can rely on – you don't get that back here in garrison – but seeing it at NTC is different – also at a field exercise." Referring to the effectiveness of Mungadai training for training intangibles one Soldier said "To develop intangibles – best I've seen in my career is the Mungadai – they wear your a** out for three days. It's physically challenging, and pushes you as a group."

Soldiers also frequently mentioned (33% of sessions) the value of group or team feedback during After Action Reviews (AAR). One Soldier said "AARs are useful because multiple perspectives come out – facilitated by a superior – it allows units to self discover strengths and weaknesses. Superior needs to ask the right questions to draw out the discussion." Thus, team-based AARs and group feedback enhance the use of team building and collaborative training methods.

Self-explanation. Soldiers were asked whether the various training events allow them to explain their grasp of the training exercise and discuss examples of their performance during training. The three highest rated events for this training method were NTC (*M*=4.42, *SD*=.87), field exercises (*M*=4.11, *SD*=.81), and OJT (*M*=3.93, *SD*=.65). However, self-explanation was not a frequently mentioned theme in the interview and focus group sessions.

Training events and instructor support. Soldiers were asked whether the various training events provided a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills. The three highest rated training events were NTC (*M*=4.30, *SD*=.98), field exercises (*M*=4.25, *SD*= .81), and Ranger School/Mungadai training (*M*=4.07, *SD*=.96). Also, Soldiers were asked whether the various training events have an instructor or leader who is able to guide and challenge development during training. The three highest rated training events were Ranger School/Mungadai training (*M*=4.36, *SD*=.93), NTC (*M*=4.27, *SD*=.96), and the combat life-saver training/MSTC training/trauma lane (*M*=4.26, *SD*=.79). Notably, these means were highest in comparison to other training methods signifying that this training method is prevalent in a number of the training events. The instructor supported training method was a frequently mentioned theme (44% of sessions). Soldier comments concerning this training method identified the continuous presence of an

evaluator as an important aspect to the success of training events. For example, one Soldier said "having a good OC (Observer Controller) at NTC is great for problem solving." Other Soldiers mentioned that at Ranger School and NTC an instructor/OC is "always there."

Several Soldiers provided comments that demonstrated the reasons behind why it is important to have good instructor support during training. Referring to a field exercise, one Soldier said "… you have the evaluator there that is a coach on simple tasks; helps you build proficiency; it's somewhat simple, but you are supported by the coach and your crew starting with simple tasks and moving up." Referring to the NTC, one Soldier said "Now it's a little more where they will coach and mentor and allow for growth. Again, because of that you can really see who is there to get something out of it. Or who is there to just kind of go through the motions and are counting down their days."

Soldiers also frequently mentioned the importance of having a role model or a leader who leads by example during training (33% of sessions). For example, one Soldier said "Soldiers will follow their leaders – you need a good leader – if he quits, that does not help that younger Soldier out at all. Everyone grew up learning or being mentored by someone. That is now lacking. Leadership is contagious – influencing positively or killing the dream." Another Soldier identified a link between leading by example and hardiness and mentioned the importance of having a superior who demonstrates how to appropriately deal with stress "They (good leaders) can deal with stress. Whether that means they keep going in front of Soldiers and then letting it out in private. You don't have to keep it in all the time to be hard, you have to keep it in and use an appropriate outlet, e.g., behind closed doors in an office. Throwing a temper tantrum in a large group isn't hard." Thus, beyond instructor support, unit leader support and their role modeling was a source of Soldier learning.

Learner-centered instruction. Soldiers were asked whether the various training events involved understanding, problem solving, and making sense of new events rather than the memorization of facts. The three highest rated training events were NTC (M=4.51, SD=.92), field exercises (M=4.36, SD=.81), and Ranger School/Mungadai training (M=4.20, SD=.94). This learning method was not a frequently mentioned theme in the interview and focus group sessions.

Learning to learn. Soldiers were asked whether the various training events allow Soldiers to critique their performance and assess their ability to learn during training. The three highest rated training events were NTC (M=4.43, SD=.91), field exercises (M=4.34, SD=.83), and gunnery (M=4.20, SD=.76). This method of learning was frequently mentioned in interview and focus group sessions (28% of sessions). One Soldier highlighted the effectiveness of this training method in a field exercise saying "When I saw them in field exercises I learned more; they could critique their own performance as they do their task." Another Soldier mentioned the effectiveness of using self-explanation during an AAR "If they can tell you what they screwed up on and if they can identify the fix for it – that is good. If it's all leader based – telling them how they screwed up – then it's not as well done. But if they can do that themselves, they will learn from it. Telling them it was done wrong will not get them there."

Summary. Three training events were consistently rated high for their providing, allowing for, or using the various learning methods: the NTC, field exercises, and Ranger School/Mungadai training. Across all training events, the most utilized learning method was having an instructor or leader who is able to guide and challenge development during training. The least utilized learning method or condition was providing realistic training. In many cases, the Soldiers identified multiple learning methods that could be used for the different events. This suggests that as many learning methods as resources will allow should be applied to training events. Also, those training events that are already rich with the use of learning methods (e.g., the NTC, field exercises, and Ranger School/Mungadai) are also the same events rated as highly effective for the measurement of intangibles. These three events are also the same ones that Soldiers identified in focus groups and interviews as best suited for the training of intangibles. Thus while causality cannot be inferred, it does seem to follow that training events possessing a profusion of learning methods are the same ones with the greatest potential for the training and measurement of intangibles.

Training Features

Training using repetition. Soldiers were asked whether the various training events use repetition to train. The three highest rated events for using repetition in training were gunnery (M=4.32, SD=.91), Combat Life-Saver Training/MSTC training/trauma lane (M=4.09, SD=.72), and field exercises (M=3.98, SD=1.11). The effective use of this feature in training the intangibles was a frequent theme (67% of sessions). Some Soldiers suggested that repetition is an important training feature. For example, one Soldier said "Repetition is huge; anything you do with Soldiers it is muscle memory; carrying a personal weapon; working with a crew; chair drills in an office, crew drills in a tank." Another Soldier said "Repetition, falls back to get a guy repeating the motions so it is second instinct." Other Soldiers believed that repetition is somewhat less useful in training, specifically for the intangibles. For example, one Soldier said "repetition doesn't necessarily get at it, but that's how the Army functions… doesn't necessarily fit the intangibles." Similarly another Soldier noted that repetition can be helpful for establishing baseline skills, but not for more complex application of those skills "… repetition gives you the how-you-do piece or how you operate as a section – but doing the same way every time doesn't build a team that can react to any situation. But first they must learn their job." One Soldier noted that the problem with repetition is that Soldiers "know what to expect." Another Soldier distinguished repetition from other training features:

> Repetition to train…I think there are two ways people learn things, rote repetition or a significant emotional event. The preferred method is for repetition. When we have enough time that is always the best. When you throw in uncertainty and stress and challenging training opportunities, you begin to approach a significant emotional event.

Thus, repetition appears to be a training feature that supports a Soldier's ability to initially react and function under difficult yet commonly experienced circumstances; a coping mechanism of sorts. At the same time, Soldiers are also saying that repetition may work against the natural inclination to adapt or innovate when confronted with challenging or complex situations.

Incorporating uncertainty into training. Soldiers were asked whether the various training events incorporate uncertainty into training. The three highest rated events for incorporating uncertainty into training were the NTC (*M*=4.62, *SD*=.89), Ranger School/Mungadai training (*M*=4.50, *SD*=.65), and field exercises (*M*=4.09, *SD*=.91). The effective use of this feature in training the intangibles was a frequent theme (72% of sessions). Soldiers often mentioned the training of uncertainty while describing a particular training event. For example, one Soldier said "In a field exercise and lanes, that is where you need ambiguity – don't know what to expect; mix it up." Another Soldier described the effectiveness of the three highest rated training events:

> Uncertainty – NTC, Mungadai events if done right, (are) the top tier, then below that is highest level field exercise. That is where I am most assessing leadership in the organization – get them to deal with uncertainty and ambiguity.

Dealing with stress in training. Soldiers were asked whether the various training events incorporate dealing with stress. The three highest rated training events for incorporating dealing with stress were Ranger School/Mungadai training (*M*=4.67, *SD*=.49), NTC (*M*=4.65, *SD*=.74), and field exercises (*M*=4.39, *SD*=.69). The effective use of this feature in training the intangibles was also a frequent theme (78% of sessions). Soldiers often directly mentioned stress as important in training intangibles. One Soldier said

> If you are looking at trying to train these, you want to incorporate stress. That is where you will be able to see if he has the will or grit to work when tired. If you can incorporate that, you will find the intangibles.

Soldiers also mentioned various training events where stress could be incorporated into training. One Soldier suggested the following training "More rigorous include spur rides and Mungadai's with bigger stressors added; then complement that with field exercises where you really stress Soldiers in ambiguous situations." Another Soldier commented on NTC "That 30 days in the middle is often times worse than real combat as far as living conditions, levels of stress, and exhaustion."

One Soldier identified the importance of conducting training right:

> … gunnery can be stressful if you do it right. If it's not done right then it's not…the same thing with an field training exercise (FTX). An FTX can be great unless it's done improperly then its garbage. You have to go long periods of time without a lot of sleep. Starting out with complex tasks and making them simpler, or else what you get is a blah kind of training and Soldiers know it and have no confidence in their abilities.

Difficult/challenging training. Soldiers were asked whether the various training events are difficult, rigorous, and challenging training opportunities. The three highest rated events that encompass difficult, rigorous, and challenging training were Ranger School/Mungadai training (*M*=4.80, *SD*=.41), NTC (*M*=4.59, *SD*=.78), and field exercises (*M*=4.20, *SD*=.85). The effective use of this feature in training the intangibles was a frequent theme (72% of sessions).

The most frequent comments concerning difficult training concerned pushing people to and beyond their limits. One Soldier identified continuous, lengthy training as a way to make training difficult: "… also longer term – FTX is a week but NTC is like four – it pushes people beyond where they would give up normally." Another Soldier said "I want to have events where I can just test you; make it as hard as possible. That is where you test will – the longer term grit."

Soldier comments that described difficult training also spoke about approaching or attaining a state of physical exhaustion. One Soldier said "Mungadai – they wear your a** out. It's physically challenging and pushes you as a group. You conduct physically demanding operations over a period of time." Another Soldier put it simply "Smoke them – that's what you have to do." Lastly, Soldiers mentioned the use of adverse weather or training conditions in making training more difficult. For example, one Soldier said "extended over 24-48 hours – and with weather and fatigue, then you get to the 'grit' part of it."

Negative training features. Soldiers were asked whether the various training events focus too much on qualifying. Soldiers responded that the three events that focus too much on qualifying are gunnery (M=3.54, SD=1.27), Basic Training problem solving exercises (M=3.16, SD=1.05), and Combat Life-Saver Training/MSTC training/trauma lane (M=2.85, SD=1.09). Also, Soldiers were asked whether the various training events are generally a check the box training activity. Soldiers responded that the three events known to be a check the box training activity are PowerPoint training (M=3.68, SD=1.29), classroom training (M=3.58, SD=1.23), and Resiliency Training (M=3.35, SD=1.07).

Summary. The preceding results suggest that the training features most appropriate for training the intangibles incorporate uncertainty, stress, and making training difficult. There were mixed views on the utility of repetition as a training feature. Soldiers' comments suggest the training events that rely most on repetition (e.g., gunnery) may be more appropriate for building baseline skills and less effective at training intangibles. The three training events possessing the most effective training features were Ranger School/Mungadai training, the NTC, and field exercises. They were cited specifically by interview and focus group Soldiers as being characterized by uncertainty and difficulty, both of which contribute to the high amount of stress experienced by some individuals.

Measuring Intangibles in the Field

The questionnaire results suggest that the most effective training events for the intangibles are Ranger School, the NTC, field exercises, OJT, and gunnery. These results were consistent with Soldiers' comments throughout the interview and focus group sessions. Specifically, Soldiers were asked "Where do you think training on intangibles could fit into existing pre-deployment training while adding minimal burden?" Soldiers tended to respond with the same events that are mentioned above. Another frequent theme was that physical training (PT) was effective at training the intangibles (50% of sessions). That PT is effective at training intangibles is somewhat at odds with previous findings that indicated complex, multi-task field (e.g. Ranger School, NTC, field exercise) situations were required for the training of intangibles. Perhaps reaching and passing levels of physical exhaustion through rigorous PT

contributes to the development of intangibles. This finding opens the door to less resource intensive ways of attaining Soldier psychological readiness through the training of intangibles.

Important to the fielding of intangible measures, Soldiers frequently mentioned that there was not enough time for training (39% of sessions). The current training requirements and deployment cycle does not support a recommendation from this research to merely add additional training on the intangibles specifically. Rather, intangibles training should be integrated into existing training requirements. One Soldier said "There already is way too much in pre-deployment." Another Soldier described in detail the problems associated with current training requirements and the need to make sure that basic skills training is done prior to field exercise events:

> When it's time to go to that FTX, if you are not smart along the way in doing training along the way at every opportunity at the FTX you are doing more of the basic training to get you to a certain level. As opposed to here's the training, let's start throwing in the mud and the staying up for 30 hours and all those harsh environmental conditions. You have to reach a certain level of proficiency before you introduce those conditions.

A potential implication of this observation is that Soldiers ought to first be trained on basic tactical and technical skills under normal physical environment conditions. It is then appropriate (and perhaps more effective) to change physical conditions and at the same time integrate training on intangibles into field exercises.

Measurement Characteristics

After Action Review. In focus groups and interview sessions, Soldiers were asked "How is training typically evaluated? After training, what is done to determine whether training was a success and that Soldiers were trained effectively?" The AARs were frequently mentioned (at least once in 67% of the sessions). Referring to the NTC, one Soldier described the type of AAR that is ineffective "You do a canned 3 ups 3 downs AAR which isn't very helpful. But in an FTX we could answer the 'why' more." Another Soldier mentioned that AARs at NTC are good because they are constant, "… AAR is critical and one of the things about NTC is you do AARs all the time." Another Soldier noted the value of field exercise AARs "Field exercise is best place to do it – but I've seen a lot of them done poorly; must have a good leader driving it."

Soldiers noted the importance of having a good leader facilitating AARs. One Soldier said "AARs are useful because multiple perspectives come out – facilitated by a superior – it allows a unit to self discover strengths and weaknesses. Superior needs to ask the right questions to draw out the discussion." Another Soldier said that leaders need to "Facilitate, but make them (Soldiers) discuss the issues amongst themselves. It takes an experienced leader to conduct the AAR process." An implication here is given the 'intangible' nature of intangibles; an experienced leader is most likely needed to draw out Soldier observations of initiative, will, grit, and hardiness in an AAR setting.

Rater evaluation. Soldiers identified multiple different types of raters that they thought were effective at observing performance on the intangibles and providing feedback. They were also asked to identify the accuracy of raters and their time available for observing training. Composite means were examined to specifically examine which raters were most accurate or had the most time for measuring intangibles, regardless of training event. To perform this analysis, Soldier scores on an item were averaged across the training events. Take, for example, the item "provides an environment where peers can accurately evaluate performance on intangibles." This item had 10 different scores from Soldiers (i.e., one for each of the different training events). These 10 scores were averaged together to create a composite mean for peers' ability to accurately evaluate performance on intangibles.

Composite means indicated that peer raters (M=3.47, SD=.51), superior raters (M=3.60, SD=.58), and self raters (M=3.54, SD=.62) are generally perceived to be about the same in their accuracy at observing intangibles during training; with superiors slightly more accurate. Further, composite means indicated that peer raters (M=3.41, SD=.45), superior raters (M=3.46, SD=.59), and self raters (M=3.46, SD=.60) are perceived to have about the same amount of time to observe intangibles during training.

Soldiers in interviews and focus groups mentioned several rater sources, among them superiors, as effective at measuring intangibles. And the most frequently mentioned rater source for measuring and providing feedback on the intangibles was superiors. Several different types of superiors were mentioned as effective raters, such as the first line supervisor, unit commander, platoon leader, squad leader, and team leaders. During interview and focus group sessions, Soldiers mentioned the effectiveness of instructors/ observer controllers (44% of sessions) and peer evaluation (28% of sessions). Self-rating and subordinate rating sources were discussed, but were mentioned infrequently. One point of commonality among the rating sources deemed most effective at rating intangibles is that they have had or are currently experiencing the position responsibilities of the person they are observing. This would explain why superiors, instructors/observer controllers, and peers (to a lesser extent) are reported to be effective observers of intangibles. This also points to the need to select or assign experienced and seasoned personnel for the responsibility of observing and assessing intangibles in others.

Training Performance Indicators for the Intangibles

Throughout the interviews and focus groups, two general themes regarding performance indicators emerged. First, Soldiers mentioned in 56% of sessions that the intangibles seemed to be value or trait-based. This is consistent with the literature that shows that intangibles such as hardiness are sometimes referred to as trait-based. Second, in 33% of the sessions, Soldiers mentioned that one or more of the intangibles seemed related to another one of the intangibles. Again, this is consistent with the earlier completed literature review. Implications of the first findings may be that it will be difficult for training on intangibles to gain unit leader acceptance (if they believe an intangible is not subject to development). As to the second finding, it may necessitate combining or packaging intangible measures so that the unit is not duplicating its measurement of similar constructs.

Initiative. Soldiers were asked to identify the performance indicators for initiative. There were five themes that were frequently mentioned as performance indicators for initiative. An additional performance indicator was nearly as frequent and is included in Table 3. Table 3 identifies the performance indicators that were mentioned, the percentage of sessions that the theme was mentioned in, and a representative quote for each theme.

Table 3.

Performance Indicators of Initiative

Performance Indicators	% of Sessions	Representative Quote
Knows responsibilities, takes or assumes responsibility/ownership	50%	In the absence of leadership you will see it in people who take the leadership position. You can't teach someone how to take initiative. He has to have it in him and step up in absence of leadership regardless of what other people think. When he is working with others, they know that he will take charge. It is something he brings to the team.
Anticipates what needs to be done	44%	Someone with initiative can make an educated guess on the 10-12 things that need to be done, regardless of the specifics. See that a lot at platoon sergeant (PSG) and squad leader levels… The guys able to visualize the next requirements, they just do better.
Prepares for Next Step	28%	A person who thinks about what is next and not just taking care of current problem set. And that is hard to do, you have to project. If you can anticipate and plan outside the current threat, to counteract a potential threat.
Effectively Uses Time	28%	You certainly know when it (initiative) is absent - very obvious. If they lack it, they will chase the clock all the time.
Leads Peers	28%	When you come to your company – I see an NCO sitting on a pallet doing nothing; and a SPC grabs a PFC and a -10 manual and preventive maintenance checks and services (PMCS) the entire vehicle – it takes an hour – he wants to be in charge and wants to be that leader.
Listens, Understands Big Picture/ Commander's intent	22%	The person understands the long term goals of the organization and understanding of what little things he can do to better train Soldiers. Can certainly see the big picture and the essence of what we are trying to do is not inside the domed tactical operations center (TOC) he is in.

Will. Soldiers were asked to identify the performance indicators for will. There were three themes that were frequently mentioned as performance indicators for will. Table 4 identifies the performance indicators that were mentioned, the percentage of sessions that the theme was mentioned in, and a representative quote for each theme.

Table 4.

Performance Indicators of Will

Performance Indicators	% of Sessions	Representative Quote
Persistence/How a Soldier reacts to adversity	67%	(They) keep going and not just throw their hands up and say this is a problem I've never encountered; I'm not sure what to do. They just keep trying to tackle the problem. When they run into another problem they keep at it; they stay up. I'm going against…obviously we need to train Soldiers to have a sleep plan and take care of themselves, but it's that guy who refuses to go to sleep until it's done or misses a meal and refuses to give up; doesn't take a knee or the easy way out, and continues to try to make himself better. When time gets hard, they are able to keep going. I have seen individuals who have the skill to do it, but choose not to.
Lack of Complaint/ Can-Do Attitude	22%	It's the guy that doesn't complain – whatever you throw at him he just does it. The one that doesn't have will is the one that, at mission time, will not want to go, he'll be hiding out in his room. On a mission he is the one lagging behind, wanting to stay with the trucks rather than dismount. The one with will is ready to go, standing up, and taking point.
Demonstrating a Will to Win	22%	To me, I see will as the competitive spirit. You can kind of teach that into them; to set the habit to want to win or to succeed. There are some unhealthy and healthy levels of competitive spirit – at unhealthy levels they are cheating to win – winning at all costs. In reality, it is how we win as well. You can't always pick that out watching them walk down the hallway.

Grit. Soldiers were asked to identify the performance indicators for grit. There were two themes that were mentioned as performance indicators for grit. Table 5 identifies the performance indicators that were mentioned, the percentage of sessions that the theme was mentioned in, and a representative quote for each theme.

Table 5.

Performance Indicators of Grit

Performance Indicators	% of Sessions	Representative Quote
Persistence	44%	If they have failure and continue to work hard – the Army is a great social Petri dish for this. See a kid who gets in trouble – can work harder to improve himself… You want them to see the mistake, improve themselves.
Dedication to the Army	28%	We always ask – is the organization better from the time you came in to the time you leave? A person may think this for themselves, but more honestly they should ask their peers for their perspective. So identifying someone who is motivated to improve the organization – relates to grit.

Hardiness. Soldiers were asked to identify the performance indicators for hardiness. Persistence was the only frequent theme (39% of sessions) identified as a hardiness performance indicator. One Soldier said "If you train and train and actually deploy – all you trained for is working well, and you have one thing that goes wrong and kinks the whole system – if you can't recover from that, it kills the entire deployment or rotation or whatever you are doing. It goes back to being an individual – if you can't pick yourself up, your buddy needs to pick you up." Another Soldier described how he thought hardiness could be measured "Hardiness is easily testable – we put people in so many jobs they don't want to do. Or go do a task that is completely beneath you, or that you hate. Do you have the attitude to see there is something good that will come out of it – something to learn or someone to learn from. That positive, but realistic attitude could be measured."

Conclusions

Ranger School, NTC, and field exercises were rated as the most effective training events for measuring initiative, will, grit, and hardiness. Soldiers also rated these training events most effective in both training methods and training features. Focus groups and interviews also identified them as training events that create the conditions for the testing of an individual Soldier's initiative, will, grit, and hardiness. Considerations for employing and integrating the training of intangibles into these events are discussed below.

Ranger School is a training program for which mostly combat arms personnel are selected to attend. It is not a unit home station training opportunity that could be integrated directly into BCT training. Yet the training conditions and experiences of Ranger school (e.g., difficult/rigorous training) provide indicators of what BCT trainers can do to enhance Soldier psychological readiness. Commanders, too, may want to request Ranger school slots and program a number of individuals to attend it early in the unit's ARFORGEN training cycle. And it might be given to an installation level mini Ranger school, designed to emulate some of the characteristics of Ranger school. Units can also elect to plan and execute Mungadai training at home station. Field exercise and NTC training events are also effective events for instilling and measuring the intangibles. For field exercises, commanders and training management personnel would need to integrate the training features and methods of training previously reported so that Soldier initiative, will, grit, and hardiness can be experienced, tested, and measured. Most likely superiors and/or designated observers would need to be familiarized with tools for measuring the intangibles (a forthcoming product of this research). As the unit commander and staff typically run and control field exercises, they would be in a position to ensure that the training conditions necessary for the testing and development of intangibles are, in fact, created. A focal point of AARs could also be individual and collective (e.g., unit) assessments of initiative, will, grit, and hardiness. The challenge of integrating intangibles into field exercises is gaining commander, staff, and unit attention to it and adapting training management processes to incorporate it into existing unit training.

The NTC training events share many of the same characteristics of field exercises yet much of the training is resourced and supported by the NTC itself. Due to the well-resourced and extended timeframe of NTC rotations, it already encompasses the conditions by which the strength of a Soldier's will, grit, and hardiness together with their ability to exercise initiative will be tested. What remains is for the unit commander to communicate to the NTC operations group that s/he would like their units to receive feedback on the intangibles during their NTC rotation. The commander could provide the operations group with field ready measures (a forthcoming product of this research) and request that observer/trainers discuss the measurement of intangibles with their counterpart unit leader. Thus, the commander could integrate training on intangibles within the NTC rotation.

That PT was mentioned as a way of training intangibles should not be overlooked. It is a low resource-intensive means of creating the conditions for intangibles to be in evidence. Rucksack marches, demanding obstacle courses, and even extended unit runs may evoke opportunities for a Soldier's will, for example, to be tested.

Supervisors and unit commanders were often identified as best qualified to measure the intangibles as well as facilitate AARs that integrate Soldier and unit understanding of intangibles and how they had an impact on mission accomplishment. This places a burden on the more experienced leaders of a unit. At the same time, leaders at all echelons, from team leader to commander, in positions of direct Soldier observation were deemed suitable for the measurement of intangibles. Thus, the additional time needed to measure intangibles can be distributed across the unit's leadership. So, too, dedicated observer/trainers are a resource commanders might plan for more often as part of field exercises, for the expressed purpose of supporting intangible measurement and feedback.

Lastly, BCT identification of intangible performance indicators that are mostly consistent with the literature review indicates that units recognize the importance of the intangibles selected for measurement by this research. Thus, the combination of performance indicators and representative quotes, with measures from the literature review, provides a sound foundation for the development of intangible measurement tools readily applied in a BCT training environment. This is the next step of the research.

References

Abernathy, C. M., & Hamm, R. M. (1995). *Surgical intuition*. Philadelphia: Hanley & Belfus.

American Psychological Association Board of Educational Affairs. (1997, November). Learner-centered Principles Work Group of the American Psychological Association's Board Educational Affairs (BEA). Retrieved from http://www.apa.org/ed/governance/bea/learner-centered.pdf

Atkinson, R., Renkl, A., & Merrill, M. (2003). Transitioning from studying examples to solving problems: Combining fading with prompting fosters learning. *Journal of Educational Psychology, 95*, 774-783.

Avolio, B. J., & Kahai, S. (2003). Placing the "E" in e-leadership: Minor tweak or fundamental change. In S. E. Murphy & R.E. Riggio (Eds.). *The future of leadership development* (pp. 49-70). Mahwah, NJ: Lawrence Erlbaum Associates.

Bartone, P. T. (1999). Hardiness Protects Against War-Related Stress in Army Reserve Forces. *Consulting Psychology Journal, 51*, 72-82.

Bartone, P. T., Roland, R. R., Picano, J. J., & Williams, T. J. (2008). Psychological hardiness predicts success in U.S. Army Special Forces Candidates. *International Journal of Selection and Assessment, 16*, 78-81.

Bartone, P. T., Ursano, R. J., Wright, K. W. & Ingraham, L. H. (1989). The Impact of a Military Air Disaster on the Health of Assistance Workers: A prospective study. *Journal of Nervous and Mental Disease, 177*, 317-328.

Beal, S. A. (2010). The roles of perseverance, cognitive ability, and physical fitness in U.S. Army Special Forces Assessment and Selection. (Research Report 1927). Arlington, VA: United States Army Research Institute for the Behavioral and Social Sciences.

Bell, B. S. & Kozlowski, S. W. J. (2008). Active learning: Effects of core training design elements on self-regulatory processes, learning, and adaptability. *Journal of Applied Psychology, 93*, 296-316.

Bell, B. S., & Kozlowski, S. W. J. (2010). Toward a theory of learner centered training design: An intergrative framework of active learning. In Kozlowski, S. W. J. (Eds.) & Salas, E. (Eds.) *Learning, training, and development in organizations* (pp. 263-300). New York: Routledge/Taylor & Francis Group.

Bledow, R., & Frese, M. (2009). A situational judgment test of personal initiative and its relationship to performance. *Personnel Psychology, 62*, 229-258.

Bonk, C. J., & Cunningham, D. J. (1998). Searching for learner-centered, constructivist, and sociocultural components of collaborative educational learning tools. In C. J. Bonk, & K. S. King (Eds.), *Electronic collaborators: Learner-centered technologies for literacy, apprenticeship, and discourse* (pp. 25-50). Mahwah, NJ: Erlbaum.

Chi, M. (1996). Constructing self-explanations and scaffolded explanations in tutoring. *Applied Cognitive Psychology Special issue: Reasoning Processes, 10,* S33-S49.

Cohen, M. S., Freeman, J. T., & Thompson, B. T. (1998). Critical Thinking Skills in Tactical Decision Making: A model and a training method. In J. Canon-Bowers and E. Salas, (Eds.), *Decision-making under stress: Implications for training & simulation* (pp. 155-189). Washington, DC: American Psychological Association Publications.

Cuevas, H. M., Fiore, S. M., & Oser, R. L. (2002). Scaffolding cognitive and metacognitive processes in low verbal ability learners: Use of diagrams in computer-based training environments. *Instructional Science, 30,* 433-464.

Curnow, C., Mulvaney, R., Calderon, R., Weingart, E., Nicely, K., Keller-Glaze, H., & Fallesen, J. (2006). *Advanced learning theories final report.* Fort Leavenworth, KS: Center for Army Leadership.

Department of the Army. (2006a). *Field manual 3-0. Operations.* Washington, DC: Author

Department of the Army. (2006b). *Field manual 6-22. Army leadership: Competent, confident, and agile.* Washington, DC: Author

Department of the Army. (2008). *Field manual 3-21.75. The warrior ethos and soldier combat skills.* Washington DC: Author.

DeRouin, R. E., Fritzsche, B. A., Salas, E. (2005). E-learning in organizations. *Journal of Management, 31*, 920-940

Draper, S. W. (2009). Catalytic assessment: Understanding how MCQs and EVS can foster deep learning. *British Journal of Educational Technology 40*, 285–293.

Duckworth, A. L., & Quinn, P. D. (2009). Development and validation of the short grit scale (Grit-S). *Journal of Personality Assessment, 91*, 166-174.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*, 1087-1101.

Entwistle, N., & Ramsden, R. (1983). *Understanding student learning.* London: Croom Helm.

Eschleman, K. J., & Bowling, N. A. (2010). A meta-analytic examination of hardiness. *International Journal of Stress Management, 17*, 277-307.

Ferguson, M. E. (2008, October). Outcomes based training and education: Targeting the intangibles. *The NCO Journal*, 16-21.

Fink L. D. (2003). *Creating significant learning experiences: An integrated approach to designing college courses.* San Francisco: Jossey-Bass.

Ford, J. K., Smith, E. M., Weissbein, D. A., Gully, S. M., & Salas, E. (1998). Relationships of goal orientation, metacognitive activity, and practice strategies with learning outcomes and transfer. *Journal of Applied Psychology, 83,* 218-233.

Frese, M., Fay, D., Hilburger, T., Leng, K., & Tag, A. (1997). The concept of personal initiative: Operationalization, reliability, and validity in two German samples. *Journal of Occupational and Organizational Psychology, 70,* 139-161.

Frese, M., Kring, W, Soose, A. & Zempel, J. (1996). Personal initiative at work: differences between East and West Germany. *Academy of Management Journal, 39,* 37-63.

Funk, S. C. (1992). Hardiness: A review of theory and research. *Health Psychology, 11,* 335-345.

Haskins, C. P. (2006). Infantry captains career course moves to an outcome-based curriculum. *Infantry Magazine,* Retrieved March 18, 2010 from http://findarticles.com/p/articles/mi_m0IAV/is_2_95/ai_n16690005/

Hattie, J., Biggs, J., & Purdie, N. (1996). Effects of learning skills interventions on student learnings: A meta-analysis. *Review of Educational Research, 66,* 99-136.

Hofer, B. K., & Yu, S. L. (2003). Teaching self-regulated learning through a "Learning to Learn" course. *Teaching of Psychology, 30,* pp. 30-33.

Hull, J. G., Van Treuren, R. R., & Virnelli, S. (1987). Hardiness and health: A critique and alternative approach. *Journal of Personality and Social Psychology, 37,* 1-11.

Iran-Nejad, A. (1990). Active and dynamic self-regulation of learning processes. *Review of Educational Research, 60,* 573-602.

Ivancic, K., & Hesketh, B. (2000). Learning from error in a driving simulation: Effects on driving skill and self-confidence. *Ergonomics, 43,* 1966-1984.

Joint Warfighting Center Training Development Group Analysis Division. (2009). *Outcome-based training and education: Information paper*. Retrieved March 18, 2010 from https://atn.army.mil/

Jonassen, D. H. (2007). What makes scientific problems difficult? In D. H. Jonassen (Ed.), *Learning to solve complex scientific problems* (pp. 3-23). Mahwah, NJ: Lawrence Erlbaum Associates.

Kanfer, R., & Heggestad, E. D. (1999). Individual differences in motivation: Traits and self-regulatory skills. In P. L. Ackerman, P. C. Kyllonen, & R. D. Roberts (Eds.), *Learning and individual differences. Process, trait, and content determinants* (pp. 293-309). Washington, DC: American Psychological Association.

Keith, N., & Frese, M. (2005). Self-regulation in error management training: Emotion control and metacognition as mediators of performance effects. *Journal of Applied Psychology, 90,* 677-691.

Klein, G., Salter, M., Riccio, G., & Sullivan, R. (2006). *Enhancing warrior ethos in soldier training: The teamwork development course.* (Research Product 2006-12). Arlington, VA: United States Army Research Institute for the Behavioral and Social Sciences.

Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: A prospective study. *Journal of Personality and Social Psychology, 42,* 168-177.

Kobasa, S. C. (1979) Stressful Life Events, Personality, and Health: An inquiry into hardiness. *Journal of Personality and Social Psychology, 37,* 1-11.

Kolb, D. A. (1984). *Experiential learning: Experience as the source of learning and development.* Englewood Cliffs, NJ: Prentice-Hall.

Kozlowski, S. W., Gully, S. M., Brown, K. G., Salas, E., Smith, E., & Nason, E.R. (2001). Effects of training goals and goal orientation traits on multidimensional training outcomes and performance adaptability. *Organizational Behavior and Human Decision Processes, 85,* 1-31.

Kozlowski, S. W. J., Mullins, M. E., Weissbein, D. A., Brown, K., & Bell, B.S . (2001). Developing adaptability: A theory for the design of integrated-embedded training systems. In E. Salas (Ed.), Advances in human performance and cognitive engineering research. (Vol. 1, pp. 59-123). Amsterdam: JAI/Elsevier Science.

Maddi, S. R., Khoshaba, D. M., Persico, M., Lu, J., Harvey, R., & Bleecker, F. (2002). The personality construct of hardiness: II. Relationships with comprehensive test of personality and psychopathology. *Journal of Research in Personality, 36,* 72-85.

Maddi, S. R., Matthews, M. D., Kelly, D. R., Resurreccion, N., & Villarreal, B. J. (2010). *Relationship between hardiness and performance in challenging environments.* American Psychological Association 2010 Convention Presentation.

Merrill, D. C., Reiser, B. J., Merrill, S. K., & Landes, S. (1995). Tutoring: Guided learning by doing. *Cognition and Instruction, 13,* 315-372.

McCarthey, S., & McMahon, S. (1992). From convention to invention: Three approaches to peer interactions during writing. In V. K. R. Hertz-Lazarowitz, & N. Miller (Ed.) *Interactions in Cooperative Groups*. New York: Cambridge University Press.

McCauley, C. D., Moxley, R. S., & Van Velsor, E. (Eds.) (1998). *The Center for Creative Leadership Handbook of Leadership Development.* San Francisco: Jossey-Bass.

McDaniel, W. R. (2009). *Outcome-based training and education (OBTE) integration workshop—final report.* Laurel, Maryland: John Hopkins University, Applied Physics Laboratory.

Merrill, D. C., Reiser, B. J., & Merrill, S. K. (1995). *Tutoring: Guided learning by doing. Cognition & Instruction, 13,* 315-372.

Motowidlo S. J., Van Scotter J. R. (1994). Evidence that task performance should be distinguished from contextual performance. *Journal of Applied Psychology, 79,* 475-480.

Mueller, D. & Strohmeier, S. (2010). Design characteristics of virtual learning environments: An expert study. *International Journal of Training and Development, 14,* 209-222.

Orvis, K. L., Wisher, R. A., Bonk, C. J., & Olson, T. M. (2002). Communication patterns during synchronous web-based military training in problem solving. *Computers in Human Behavior, 18,* 783-795.

Parush, A., Hamm, H., & Shtub, A. (2002). Learning histories in simulation-based teaching: The effects on self-learning and transfer. *Computers & Education, 39,* 319-332.

Perry, R. C., & McEnery, K. (2009). Army reconnaissance course: Defining the aim point for reconnaissance leader training. *Armor,* Retrieved March 18, 2010 from https://atn.army.mil/

Pressley, M., & Woloshyn, V. (1995). *Cognitive strategy instruction that really improves children's academic performance.* Cambridge, MA: Brookline Books.

Ramsden, P. (1992). *Learning to teach in Higher Education*. London: Routledge.

Riccio, G., Sullivan, R., Klein, G., Salter, M., & Kinnison, H. (2004). *Warrior ethos: Analysis of the concept and initial development of applications.* (Research Report 1827). Arlington, VA: United States Army Research Institute for the Behavioral and Social Sciences.

Ringenberg, M. & VanLehn, K. (2006). Scaffolding problem solving with annotated, worked-out examples to promote deep learning. In K. Ashley & M. Ikeda (Eds.), Intelligent Tutoring Systems: 8th International Conference, ITS2006. pp. 625-634. Amsterdam: IOS Press.

Shuffler, M. L., & Goodwin, G. F. (2008). Shared mental models in collaborative learning environments: The role of the instructor. In K. Orvis & A. Lassiter (Eds.), *Computer supported collaborative learning: Best practices and principles for instructors*. New York: Idea Group.

Simpson, M. L., Hynd, C. R., Nist, S. L., & Burrell, K. I. (1997). College academic assistance programs and practices. *Educational Psychology Review, 9,* 39-87.

Spiro, R. J., Feltovich, P., & Coulson, R. (2004). Cognitive flexibility theory. Retrieved March 18, 2010 from http://tip.psychology.org/spiro.html

Spiro, R. J., Feltovich, P. J., Jacobson, M. J., & Coulson, R. L. (1992). Cognitive flexibility, constructivism and hypertext: Random access for advanced knowledge acquisition in ill-structured domains. In T.F. Duffy & D. Jonassen (Eds.), *Constructivism and the technology of instruction.* Hillside, NJ: Erlbaum.

Stefanov, K., Stoyanov, S., & Nikolov, R. (1998). Design issues of a distance learning course on business on the Internet. *Journal of Computer Assisted Learning, 14,* 83-90.

Tice, J. (2008). Soldier training is in for a big overhaul. *Army Times On-line*. Retrieved March 18, 2010 from http://www.armytimes.com/news/2008/04/army_training_040608w/

Trafton, J. G., & Trickett, S. B. (2001). Note-taking for self-explanation and problem solving. *Human-Computer Interaction, 16,* 1-38.

Van Dijk, T. A., & Kintsch, W. (1983) *Strategies of discourse comprehension*. New York: Academic Press.

VanLehn, K., Jones, R. M. & Chi, M. (1992). A model of the self-explanation effect. *Journal of the Learning Sciences, 2,* 160.

Vogt, D. S., Rizvi, S. L., Shipherd, J. C., & Resick, P. A. (2008). Longitudinal investigation of reciprocal relationship between stress reactions and hardiness. *Personality and Social Psychology Bulletin, 34,* 61-73.

Wisher, R. A., & Graesser, A. C. (2007). Question asking in advanced distributed learning environments. In S. M. Fiore and E. Salas (Eds.), *Toward a science of distributed learning and training* (pp. 209-234). Washington, DC: American Psychological Association.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology, 81,* 329-339.

APPENDIX A

PHASE II QUESTIONNAIRE

Start each sentence with the following different Training Events

	Please read through the statements by starting each sentence with one of the training events to the right, and then reading the sentences located below. Rate your agreement with each statement by responding with one of the following response options (0=N/A or No Response, 1= Strongly disagree, 2= Disagree, 3= Neutral, 4=Agree, 5= Strongly Agree	A Field Exercise	NTC	Gunnery	Resiliency Training	Combat Life-Saver Training/ MSTC Training/ Trauma Lane	Ranger School/Mungadai Training	Basic Training Problem Solving exercises	Classroom Training	Power Point Training	On the Job Training
Training Methods	provides practice and experience in training										
	provides realism during training										
	provides multiple, different opportunities to apply knowledge and skills										
	offers a collaborative or Team-based training experience										
	allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training										
	provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills										
	has an instructor or leader who is able to guide and challenge development during training										
	involves understanding, problem solving, and making sense of new events rather than the memorization of facts										
	allows participants to critique their performance and assess their ability to learn during training										
Training Features	uses repetition to train										
	incorporates uncertainty into training										
	incorporates dealing with stress										
	is a difficult, rigorous, and challenging training opportunity										
	focuses too much on qualifying										
	is generally a check the box training activity										

Start each sentence with the following different Training Environments

	Please read through the statements by starting each sentence with one of the training events to the right and then reading the sentences located below. Rate your agreement with each statement by responding with one of the following response options (0=N/A or No Response, 1= Strongly disagree, 2= Disagree, 3= Neutral, 4=Agree, 5= Strongly Agree	A Field Exercise	NTC	Gunnery	Resiliency Training	Combat Life-Saver Training/ MSTC Training/ Trauma Lane	Ranger School/Mungadai Training	Basic Training Problem Solving exercises	Classroom Training	Power Point Training	On the Job Training
Rater and Time Concerns	provides an environment where **peers** can accurately evaluate performance on intangibles										
	provides a sufficient amount of time for **peers** to observe and critique performance on intangibles										
	provides an environment where **superiors** can accurately evaluate performance on intangibles										
	provides a sufficient amount of time for **superiors** to observe and critique performance on intangibles										
	provides an environment where Soldiers can accurately evaluate **their own** performance on intangibles										
	provides a sufficient amount of time for Soldiers to observe and critique **their own** performance on intangibles										
	provides a sufficient amount of time for **superiors/instructors** to give individual feedback										
Intangibles	is an excellent environment to measure Soldier's Initiative										
	is an excellent environment to measure Soldier's Will										
	is an excellent environment to measure Soldier's Grit										
	is an excellent environment to measure Soldier's Hardiness										

APPENDIX B

INTERVIEW AND FOCUS GROUP PROTOCOL

Preparatory Skill Set for Brigade Combat Teams (BCT) Protocol

Session Information

Date: _____

Time: _____

Interviewer: _____

Interviewee's Title/Position: _____

Introduction and Research Purpose

Good morning/good afternoon and thank you for taking the time to participate in this focus group/interview. My name is _____ with ICF International. I am part of a research team that has been contracted by the U.S. Army Research Institute (ARI) to identify important skill sets to Soldier mission readiness. The skill set of interest in this research is collectively termed intangibles; specifically the intangibles Initiative, will, grit, and hardiness. *Provide definitions of intangibles*.

- Initiative – the willingness to act in the absence of orders, when existing orders no longer fit the situation, or when unforeseen opportunities or threats arise.
- Will – inner drive that compels Soldiers to keep going, even when exhausted, hungry, afraid, cold, and wet.
- Grit – perseverance and passion for long-term goals. Grit entails working strenuously in the face of challenges and maintaining effort and interest over years despite failure, adversity, and plateaus in progress.
- Hardiness – a specific set of attitudes and skills that provide the courage, motivation, and strategies leading to resilience and growth in stressful circumstances.

Further, we will be asking questions concerning the effectiveness of various training methods and training features. The information you provide today will be applied to better develop, execute, and assess the training of intangibles.

The interview session *(focus group)* will take 60 minutes (*90 minutes)* to complete.

Privacy Act Statement & Consent Form

Please note that your participation is voluntary – there are no consequences if you choose not to participate. Everything you say will remain confidential. We will be transcribing your responses with laptops or digitally recording your responses with a voice recorder, but our analysis and reporting of your responses will be at the group or aggregate level—not at the individual level. No information collected or response will be attributed or linked to any one individual.

To more fully explain the confidentiality process and how we will be using the information you provide today, I have a privacy statement and consent form for you to read over. Please take a few minutes to read over both documents. If you choose to participate, please sign the second page of the consent form and indicate that you are over 18 years old and are voluntarily agreeing to participate. Please let me know if you have any questions about the privacy statement, consent form, or the session today. (*Wait until it looks as though everyone has finished reading and then ask for the signed consent forms).*

Do you have any questions for me at this time either in terms of the content of our conversation or anything else? (*Answer any questions that may arise*). We have a questionnaire for you to fill out (*hand out questionnaire*). Please read through the instructions and take a few minutes to fill out the questionnaire. After you are finished with the questionnaire, we will begin our discussion.

In this section, we will discuss the training methods and learning theories used in existing exercises, venues, and activities.

- Of the training methods listed on the questionnaire, which ones do you feel are most essential in effectively training intangibles such as initiative, will, grit, and hardiness?
    - Why are the ones you identified more important than the others?
- Of the training features listed on the questionnaire, which ones do you feel are most essential in effectively training intangibles such as initiative, will, grit, and hardiness?
    - Why are the ones you identified more important than the others?
- Think of the most effective training event you've ever participated in. Why was this so effective for you?
    - Did it utilize any of the training methods or features?

In this second section, we will discuss what measurement characteristics are most appropriate and how measurement of intangibles can be accomplished and adapted to the field.

- How is training typically evaluated? After training, what is done to determine whether training was a success and that Soldiers were trained effectively?
- What training events usually incorporate individual feedback from superiors?
  - How much time do superiors spend providing individual feedback on training performance?
  - What type of feedback do superiors provide following training?
- Who is most accurate in observing and providing ratings during training (e.g., self, peers, superiors, and independent instructors)?
  - Does the most accurate group also have time available to provide ratings and feedback?
- Where do you think training on initiative could fit into existing pre-deployment training while adding minimal burden?
  - In which of the training events provided would be the best setting for training initiative?
- Where do you think training on will could fit into existing pre-deployment training while adding minimal burden?
  - In which of the training events provided would be the best setting for training will?
- Where do you think training on grit could fit into existing pre-deployment training while adding minimal burden?
  - In which of the training events provided would be the best setting for training grit?
- Where do you think training on hardiness could fit into existing pre-deployment training while adding minimal burden?
  - In which of the training events provided would be the best setting for training hardiness?

In this final section, we will discuss the training performance indicators for the selected intangibles.

- During training, what are the indicators that distinguish someone who has initiative from someone who doesn't?
- During training, what are the indicators that distinguish someone who has will from someone who doesn't?
- During training, what are the indicators that distinguish someone who has grit from someone who doesn't?
- During training, what are the indicators that distinguish someone who has hardiness from someone who doesn't?

That concludes the questions that we had prepared for you.

De-Briefing:

Thank you again for your time and participation. Your comments have been very helpful. Our data-collection is on-going. There will be a report issued at the conclusion of this project. If you are interested in receiving a copy, please provide us with your e-mail address and we will send you one once it is complete.

APPENDIX C

QUANTITATIVE RESULTS – TRAINING METHODS

Statement	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
	NTC provides practice and experience in training.	46	4	4.52	0.81
	A Field exercise provides practice and experience in training.	46	3	4.47	0.66
	On-the-job training provides practice and experience in training.	46	2	4.35	0.64
	Ranger School/Mungadai training provides practice and experience in training.	46	2	4.33	0.82
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides practice and experience in training.	46	2	4.32	0.60
	Gunnery provides practice and experience in training.	46	3	4.24	0.66
	Resiliency training provides practice and experience in training.	46	4	3.24	1.00
	Basic training problem solving exercises provides practice and experience in training.	46	4	3.21	0.84
	Classroom training provides practice and experience in training.	46	4	3.17	1.00
	PowerPoint training provides practice and experience in training.	46	3	2.51	0.92

Statement	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
	NTC provides realism during training.	46	4	4.48	0.78
	Ranger School/Mungadai training provides realism during training.	46	2	4.20	0.86
	A Field exercise provides realism during training.	46	3	4.11	0.69
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides realism during training.	46	3	4.07	0.82
	On-the-job training provides realism during training.	46	4	4.07	0.89
	Gunnery provides realism during training.	46	3	3.63	0.92
	Basic training problem solving exercises provides realism during training.	46	3	3.24	0.79
	Resiliency training provides realism during training.	46	3	2.91	0.88
	Classroom training provides realism during training.	46	3	2.38	0.98
	PowerPoint training provides realism during training.	46	3	2.09	0.94

	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
Statement	NTC provides multiple, different opportunities to apply knowledge and skills.	46	4	4.52	0.84
	A Field exercise provides multiple, different opportunities to apply knowledge and skills.	46	3	4.38	0.81
	Ranger School/Mungadai training provides multiple, different opportunities to apply knowledge and skills.	46	2	4.33	0.72
	On-the-job training provides multiple, different opportunities to apply knowledge and skills.	46	3	4.15	0.76
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides multiple, different opportunities to apply knowledge and skills.	46	4	3.95	0.91
	Gunnery provides multiple, different opportunities to apply knowledge and skills.	46	4	3.85	1.00
	Basic training problem solving exercises provides multiple, different opportunities to apply knowledge and skills.	46	4	3.53	0.86
	Resiliency training provides multiple, different opportunities to apply knowledge and skills.	46	4	3.12	0.88
	Classroom training provides multiple, different opportunities to apply knowledge and skills.	46	3	2.96	0.89
	PowerPoint training provides multiple, different opportunities to apply knowledge and skills.	46	3	2.34	0.91

Statement	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
	NTC offers a collaborative or team-based training experience.	46	4	4.63	0.74
	A Field exercise offers a collaborative or team-based training experience.	46	2	4.38	0.58
	Ranger School/Mungadai training offers a collaborative or team-based training experience.	46	3	4.27	1.10
	Gunnery offers a collaborative or team-based training experience.	46	4	4.03	0.86
	On-the-job training offers a collaborative or team-based training experience.	46	3	3.82	0.78
	Basic training problem solving exercises offers a collaborative or team-based training experience.	46	4	3.63	1.06
	Combat Life-Saver training/ MSTC training/ Trauma Lane offers a collaborative or team-based training experience.	46	4	3.58	1.10
	Resiliency training offers a collaborative or team-based training experience.	46	3	3.03	0.82
	Classroom training offers a collaborative or team-based training experience.	46	4	2.76	1.07
	PowerPoint training offers a collaborative or team-based training experience.	46	3	2.35	0.87

Statement	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
	NTC allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	4	4.42	0.87
	A Field exercise allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	3	4.11	0.81
	On-the-job training allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	2	3.93	0.65
	Gunnery allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	3	3.93	0.76
	Ranger School/Mungadai training allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	3	3.73	1.03
	Combat Life-Saver training/ MSTC training/ Trauma Lane allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	3	3.70	0.89
	Basic training problem solving exercises allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	2	3.64	0.65
	Classroom training allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	4	3.54	0.89
	Resiliency training allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	4	3.15	0.94
	PowerPoint training allows Soldiers to explain their grasp of the training exercise and discuss examples of their performance during training.	46	3	2.88	0.93

	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
Statement	NTC provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	4	4.30	0.98
	A Field exercise provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	3	4.25	0.81
	Ranger School/Mungadai training provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	3	4.07	0.96
	On-the-job training provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	3	4.02	0.69
	Gunnery provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	3	3.90	0.74
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	3	3.82	0.72
	Basic training problem solving exercises provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	4	3.46	0.89
	Resiliency training provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	4	3.27	0.91
	Classroom training provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	4	3.20	0.95
	PowerPoint training provides a support structure (e.g., peers or a leader) helpful in building knowledge of simple tasks into complex skills.	46	4	2.70	1.04

Statement	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
	Ranger School/Mungadai training has an instructor or leader who is able to guide and challenge development during training.	46	3	4.36	0.93
	NTC has an instructor or leader who is able to guide and challenge development during training.	46	4	4.27	0.96
	Combat Life-Saver training/ MSTC training/ Trauma Lane has an instructor or leader who is able to guide and challenge development during training.	46	3	4.26	0.79
	A Field exercise has an instructor or leader who is able to guide and challenge development during training.	46	3	4.18	0.84
	Gunnery has an instructor or leader who is able to guide and challenge development during training.	46	3	3.95	0.85
	Basic training problem solving exercises has an instructor or leader who is able to guide and challenge development during training.	46	3	3.94	0.79
	On-the-job training has an instructor or leader who is able to guide and challenge development during training.	46	3	3.89	0.86
	Classroom training has an instructor or leader who is able to guide and challenge development during training.	46	4	3.83	0.85
	Resiliency training has an instructor or leader who is able to guide and challenge development during training.	46	4	3.50	1.02
	PowerPoint training has an instructor or leader who is able to guide and challenge development during training.	46	4	3.09	1.12

Statement	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
	NTC involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	4	4.51	0.92
	A Field exercise involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	3	4.36	0.81
	Ranger School/Mungadai training involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	3	4.20	0.94
	On-the-job training involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	3	3.89	0.82
	Combat Life-Saver training/ MSTC training/ Trauma Lane involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	4	3.79	0.80
	Basic training problem solving exercises involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	3	3.79	0.82
	Gunnery involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	4	3.35	1.17
	Resiliency training involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	4	3.33	0.92
	Classroom training involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	4	3.11	1.05
	Power Point Training involves understanding, problem solving, and making sense of new events rather than the memorization of facts.	46	3	2.48	1.07

Statement	Training Event Quantitative Results – Training Methods	Count	Range	Mean	Standard Deviation
	NTC allows Soldiers to critique their performance and assess their ability to learn during training.	46	4	4.43	0.91
	A Field exercise allows Soldiers to critique their performance and assess their ability to learn during training.	46	3	4.34	0.83
	Gunnery allows Soldiers to critique their performance and assess their ability to learn during training.	46	3	4.20	0.76
	Ranger School/Mungadai training allows Soldiers to critique their performance and assess their ability to learn during training.	46	3	4.13	0.99
	Combat Life-Saver training/ MSTC training/ Trauma Lane allows Soldiers to critique their performance and assess their ability to learn during training.	46	2	3.98	0.71
	On-the-job training allows Soldiers to critique their performance and assess their ability to learn during training.	46	3	3.89	0.80
	Basic training problem solving exercises allows Soldiers to critique their performance and assess their ability to learn during training.	46	3	3.48	0.91
	Classroom training allows Soldiers to critique their performance and assess their ability to learn during training.	46	4	3.18	1.02
	Resiliency training allows Soldiers to critique their performance and assess their ability to learn during training.	46	4	3.15	0.97
	PowerPoint training allows Soldiers to critique their performance and assess their ability to learn during training.	46	4	2.63	1.09

APPENDIX D

QUANTITATIVE RESULTS – TRAINING FEATURES

	Training Event Quantitative Results – Training Features	Count	Range	Mean	Standard Deviation
Statement	Gunnery uses repetition to train.	46	3	4.32	0.91
	Combat Life-Saver training/ MSTC training/ Trauma Lane uses repetition to train.	46	2	4.09	0.72
	A Field exercise uses repetition to train	46	4	3.98	1.11
	Ranger School/Mungadai training uses repetition to train.	46	3	3.93	1.07
	NTC uses repetition to train.	46	4	3.89	1.15
	Basic training problem solving exercises uses repetition to train.	46	3	3.74	0.89
	On-the-job training uses repetition to train.	46	3	3.69	0.97
	Resiliency training uses repetition to train.	46	4	3.36	0.90
	Classroom training uses repetition to train.	46	4	3.36	1.01
	PowerPoint training uses repetition to train.	46	4	2.86	1.32

	Training Event Quantitative Results – Training Features	Count	Range	Mean	Standard Deviation
Statement	NTC incorporates uncertainty into training.	46	4	4.62	0.89
	Ranger School/Mungadai training incorporates uncertainty into training.	46	2	4.50	0.65
	A Field exercise incorporates uncertainty into training.	46	4	4.09	0.91
	Combat Life-Saver training/ MSTC training/ Trauma Lane incorporates uncertainty into training.	46	4	3.60	1.06
	Basic training problem solving exercises incorporates uncertainty into training.	46	4	3.45	1.00
	On-the-job training incorporates uncertainty into training.	46	4	3.44	1.08
	Resiliency training incorporates uncertainty into training.	46	4	2.85	0.94
	Gunnery incorporates uncertainty into training.	46	4	2.80	1.20
	Classroom training incorporates uncertainty into training.	46	3	2.32	0.88
	PowerPoint training incorporates uncertainty into training.	46	3	2.07	0.91

	Training Event Quantitative Results – Training Features	Count	Range	Mean	Standard Deviation
Statement	Ranger School/Mungadai training incorporates dealing with stress.	46	1	4.67	0.49
	NTC incorporates dealing with stress.	46	4	4.65	0.74
	A Field exercise incorporates dealing with stress.	46	3	4.39	0.69
	Combat Life-Saver training/ MSTC training/ Trauma Lane incorporates dealing with stress.	46	3	4.10	0.85
	Gunnery incorporates dealing with stress.	46	3	3.78	1.00
	On-the-job training incorporates dealing with stress.	46	3	3.73	0.84
	Basic training problem solving exercises incorporates dealing with stress.	46	4	3.59	0.96
	Resiliency training incorporates dealing with stress.	46	4	3.12	1.12
	Classroom training incorporates dealing with stress.	46	3	2.26	0.91
	PowerPoint training incorporates dealing with stress.	46	3	1.98	0.90

Statement	Training Event Quantitative Results – Training Features	Count	Range	Mean	Standard Deviation
	Ranger School/Mungadai training is a difficult, rigorous, and challenging training opportunity.	46	1	4.80	0.41
	NTC is a difficult, rigorous, and challenging training opportunity.	46	4	4.59	0.78
	A Field exercise is a difficult, rigorous, and challenging training opportunity.	46	3	4.20	0.85
	Gunnery is a difficult, rigorous, and challenging training opportunity.	46	3	3.93	0.83
	Combat Life-Saver training/ MSTC training/ Trauma Lane is a difficult, rigorous, and challenging training opportunity.	46	3	3.76	0.79
	On-the-job training is a difficult, rigorous, and challenging training opportunity.	46	4	3.61	1.04
	Basic training problem solving exercises is a difficult, rigorous, and challenging training opportunity.	46	4	3.41	1.08
	Resiliency training is a difficult, rigorous, and challenging training opportunity.	46	4	2.85	1.00
	Classroom training is a difficult, rigorous, and challenging training opportunity.	46	3	2.36	0.96
	PowerPoint training is a difficult, rigorous, and challenging training opportunity.	46	3	2.09	0.94

Statement	Training Event Quantitative Results – Training Features	Count	Range	Mean	Standard Deviation
	Gunnery focuses too much on qualifying.	46	4	3.54	1.27
	Basic training problem solving exercises focuses too much on qualifying.	46	4	3.16	1.05
	Combat Life-Saver training/ MSTC training/ Trauma Lane focuses too much on qualifying.	46	4	2.85	1.09
	Ranger School/Mungadai training focuses too much on qualifying.	46	4	2.79	1.19
	Classroom training focuses too much on qualifying.	46	4	2.78	1.19
	PowerPoint training focuses too much on qualifying.	46	4	2.73	1.26
	NTC focuses too much on qualifying.	46	4	2.62	1.21
	A Field exercise focuses too much on qualifying.	46	4	2.52	1.13
	Resiliency training focuses too much on qualifying.	46	3	2.47	0.80
	On-the-job training focuses too much on qualifying.	46	3	2.13	0.92

	Training Event Quantitative Results – Training Features	Count	Range	Mean	Standard Deviation
Statement	PowerPoint training is generally a check the box training activity.	46	4	3.68	1.29
	Classroom training is generally a check the box training activity.	46	4	3.58	1.23
	Resiliency training is generally a check the box training activity.	46	4	3.35	1.07
	Basic training problem solving exercises is generally a check the box training activity.	46	4	2.97	1.15
	Combat Life-Saver training/ MSTC training/ Trauma Lane is generally a check the box training activity.	46	4	2.58	1.28
	Gunnery is generally a check the box training activity.	46	4	2.56	1.21
	NTC is generally a check the box training activity.	46	4	2.28	1.22
	A Field exercise is generally a check the box training activity.	46	3	2.27	1.04
	On-the-job training is generally a check the box training activity.	46	4	2.07	0.97
	Ranger School/Mungadai training is generally a check the box training activity.	46	2	1.57	0.65

APPENDIX E

QUANTITATIVE RESULTS – RATER AND TIME CONCERNS

	Training Event Quantitative Results – Rater And Time Concerns	Count	Range	Mean	Standard Deviation
Statement	Ranger School/Mungadai training provides an environment where peers can accurately evaluate performance on intangibles.	46	2	4.44	0.81
	NTC provides an environment where peers can accurately evaluate performance on intangibles.	46	3	4.39	0.86
	A Field exercise provides an environment where peers can accurately evaluate performance on intangibles.	46	3	4.16	0.83
	On-the-job training provides an environment where peers can accurately evaluate performance on intangibles.	46	3	4.00	0.86
	Gunnery provides an environment where peers can accurately evaluate performance on intangibles.	46	4	3.65	1.12
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides an environment where peers can accurately evaluate performance on intangibles.	46	4	3.49	0.96
	Basic training problem solving exercises provides an environment where peers can accurately evaluate performance on intangibles.	46	4	3.15	0.94
	Resiliency training provides an environment where peers can accurately evaluate performance on intangibles.	46	4	2.91	0.80
	Classroom training provides an environment where peers can accurately evaluate performance on intangibles.	46	3	2.66	0.94
	PowerPoint training provides an environment where peers can accurately evaluate performance on intangibles.	46	3	2.02	0.99

	Training Event Quantitative Results – Rater And Time Concerns	Count	Range	Mean	Standard Deviation
Statement	Ranger School/Mungadai training provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	2	4.44	0.81
	NTC provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	3	4.00	1.03
	On-the-job training provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	3	3.93	0.93
	A Field exercise provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	3	3.84	0.94
	Gunnery provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	4	3.63	0.98
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	4	3.42	1.01
	Basic training problem solving exercises provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	4	3.27	0.84
	Resiliency training provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	3	2.88	0.78
	Classroom training provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	4	2.80	1.07
	PowerPoint training provides a sufficient amount of time for peers to observe and critique performance on intangibles.	46	4	2.21	1.21

	Training Event Quantitative Results – Rater And Time Concerns	Count	Range	Mean	Standard Deviation
Statement	NTC provides an environment where superiors can accurately evaluate performance on intangibles.	46	3	4.39	0.86
	A Field exercise provides an environment where superiors can accurately evaluate performance on intangibles.	46	3	4.18	0.86
	On-the-job training provides an environment where superiors can accurately evaluate performance on intangibles.	46	4	4.04	0.97
	Ranger School/Mungadai training provides an environment where superiors can accurately evaluate performance on intangibles.	46	4	4.00	1.21
	Gunnery provides an environment where superiors can accurately evaluate performance on intangibles.	46	4	3.98	1.05
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides an environment where superiors can accurately evaluate performance on intangibles.	46	4	3.60	0.98
	Basic training problem solving exercises provides an environment where superiors can accurately evaluate performance on intangibles.	46	3	3.58	0.94
	Resiliency training provides an environment where superiors can accurately evaluate performance on intangibles.	46	4	2.97	0.90
	Classroom training provides an environment where superiors can accurately evaluate performance on intangibles.	46	4	2.89	1.17
	PowerPoint training provides an environment where superiors can accurately evaluate performance on intangibles.	46	4	2.26	1.29

Statement	Training Event Quantitative Results – Rater And Time Concerns	Count	Range	Mean	Standard Deviation
	NTC provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	4.09	1.03
	On-the-job training provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	3.96	0.99
	A Field exercise provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	3.93	1.01
	Gunnery provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	3.78	1.03
	Ranger School/Mungadai training provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	3.63	1.31
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	3.44	1.03
	Basic training problem solving exercises provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	3.21	0.82
	Resiliency training provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	3.13	0.91
	Classroom training provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	2.87	1.14
	PowerPoint training provides a sufficient amount of time for superiors to observe and critique performance on intangibles.	46	4	2.26	1.27

	Training Event Quantitative Results – Rater And Time Concerns	Count	Range	Mean	Standard Deviation
Statement	Ranger School/Mungadai training provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	2	4.19	0.75
	NTC provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	3	4.13	0.98
	A Field exercise provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	3	3.96	0.98
	On-the-job training provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	3	3.91	0.90
	Gunnery provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	4	3.88	1.02
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	4	3.65	1.07
	Resiliency Training provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	4	3.42	0.87
	Basic training problem solving exercises provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	4	3.39	1.09
	Classroom training provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	4	2.84	1.19
	PowerPoint training provides an environment where Soldiers can accurately evaluate their own performance on intangibles.	46	4	2.23	1.21

Statement	Training Event Quantitative Results – Rater And Time Concerns	Count	Range	Mean	Standard Deviation
	NTC provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	4	4.00	1.04
	A Field exercise provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	3	3.93	0.89
	On-the-job training provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	3	3.91	0.94
	Gunnery provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	3	3.83	0.90
	Ranger School/Mungadai training provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	3	3.75	0.93
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	4	3.56	1.10
	Resiliency training provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	4	3.34	0.83
	Basic training problem solving exercises provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	4	3.30	0.88
	Classroom training provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	4	2.80	1.24
	PowerPoint training provides a sufficient amount of time for Soldiers to observe and critique their own performance on intangibles.	46	4	2.26	1.27

	Training Event Quantitative Results – Rater And Time Concerns	Count	Range	Mean	Standard Deviation
Statement	On-the-job training provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	3	4.11	0.83
	Gunnery provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	3	4.10	0.78
	NTC provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	4	4.02	1.04
	Ranger School/Mungadai training provides a sufficient amount of time for superiors/ instructors to give individual feedback.	46	4	3.88	1.15
	A Field exercise provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	3	3.80	0.98
	Combat Life-Saver training/ MSTC training/ Trauma Lane provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	4	3.67	0.94
	Basic training problem solving exercises provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	4	3.45	0.97
	Resiliency training provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	4	3.22	0.79
	Classroom training provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	4	3.11	1.32
	PowerPoint training provides a sufficient amount of time for superiors/instructors to give individual feedback.	46	4	2.70	1.42

APPENDIX F

QUANTITATIVE RESULTS – INTANGIBLES

Statement	Training Event Quantitative Results – Intangibles	Count	Range	Mean	Standard Deviation
	NTC is an excellent environment to measure Soldier's initiative.	46	4	4.63	0.71
	Ranger School/Mungadai training is an excellent environment to measure Soldier's initiative.	46	2	4.63	0.62
	A Field exercise is an excellent environment to measure Soldier's initiative.	46	2	4.56	0.59
	On-the-job training is an excellent environment to measure Soldier's initiative.	46	4	4.31	0.82
	Gunnery is an excellent environment to measure Soldier's initiative.	46	3	3.88	0.97
	Basic training problem solving exercises is an excellent environment to measure Soldier's initiative.	46	3	3.76	0.75
	Combat Life-Saver training/ MSTC training/ Trauma Lane is an excellent environment to measure Soldier's initiative.	46	4	3.65	0.97
	Resiliency training is an excellent environment to measure Soldier's initiative.	46	4	2.97	1.00
	Classroom training is an excellent environment to measure Soldier's initiative.	46	4	2.52	1.07
	PowerPoint training is an excellent environment to measure Soldier's initiative.	46	4	2.19	1.10

Statement	Training Event Quantitative Results – Intangibles	Count	Range	Mean	Standard Deviation
	Ranger School/Mungadai training is an excellent environment to measure Soldier's will.	46	1	4.69	0.48
	NTC is an excellent environment to measure Soldier's will.	46	4	4.65	0.71
	A Field exercise is an excellent environment to measure Soldier's will.	46	1	4.61	0.49
	On-the-job training is an excellent environment to measure Soldier's will.	46	4	4.13	0.97
	Gunnery is an excellent environment to measure Soldier's will.	46	3	3.90	0.90
	Basic training problem solving exercises is an excellent environment to measure Soldier's will.	46	4	3.61	0.93
	Combat Life-Saver training/ MSTC training/ Trauma Lane is an excellent environment to measure Soldier's will.	46	4	3.53	1.08
	Resiliency training is an excellent environment to measure Soldier's will.	46	4	3.09	0.93
	Classroom training is an excellent environment to measure Soldier's will.	46	3	2.27	1.00
	PowerPoint training is an excellent environment to measure Soldier's will.	46	3	2.00	0.93

	Training Event Quantitative Results – Intangibles	Count	Range	Mean	Standard Deviation
Statement	Ranger School/Mungadai training is an excellent environment to measure Soldier's grit.	46	1	4.63	0.50
	NTC is an excellent environment to measure Soldier's grit.	46	4	4.59	0.80
	A Field exercise is an excellent environment to measure Soldier's grit.	46	3	4.42	0.72
	On-the-job training is an excellent environment to measure Soldier's grit.	46	4	4.11	1.03
	Gunnery is an excellent environment to measure Soldier's grit.	46	3	3.73	1.06
	Combat Life-Saver training/ MSTC training/ Trauma Lane is an excellent environment to measure Soldier's grit.	46	4	3.47	1.01
	Basic training problem solving exercises is an excellent environment to measure Soldier's grit.	46	4	3.45	1.00
	Resiliency training is an excellent environment to measure Soldier's grit.	46	4	3.03	1.00
	Classroom training is an excellent environment to measure Soldier's grit.	46	3	2.20	0.98
	PowerPoint training is an excellent environment to measure Soldier's grit.	46	3	1.98	0.91

	Training Event Quantitative Results – Intangibles	Count	Range	Mean	Standard Deviation
Statement	Ranger School/Mungadai training is an excellent environment to measure Soldier's hardiness.	46	1	4.75	0.45
	NTC is an excellent environment to measure Soldier's hardiness.	46	4	4.67	0.73
	A Field exercise is an excellent environment to measure Soldier's hardiness.	46	3	4.52	0.63
	On-the-job training is an excellent environment to measure Soldier's hardiness.	46	4	4.07	0.94
	Gunnery is an excellent environment to measure Soldier's hardiness.	46	4	3.73	1.06
	Basic training problem solving exercises is an excellent environment to measure Soldier's hardiness.	46	4	3.52	0.97
	Combat Life-Saver training/ MSTC training/ Trauma Lane is an excellent environment to measure Soldier's hardiness.	46	4	3.47	1.08
	Resiliency training is an excellent environment to measure Soldier's hardiness.	46	4	3.00	0.95
	Classroom training is an excellent environment to measure Soldier's hardiness.	46	3	2.25	0.94
	PowerPoint training is an excellent environment to measure Soldier's hardiness.	46	3	2.02	0.91

APPENDIX G

QUALITATIVE ANALYSIS – THEME LIST

	Theme #	Theme
	Research Question: 1 Training Methods and Learning Theories Used in Existing Exercises, Venues, and Activities	
	1.1	**Training Methods**
	1.1.1	Practice/Experience
	1.1.2	Realism
	1.1.3	Multiple, different opportunities to apply KSAs
	1.1.4	Collaborative or Team-based
	1.1.5	Explaining grasp of training exercise
	1.1.6	Providing a support structure (e.g., OC's, Instructors, Evaluators)
	1.1.7	Involves problem solving and making sense of environment
	1.1.8	Self-Examination or Self-Assessment
	1.1.9	Crawl-Walk-Run; or Establishing a Baseline and then Introducing Complexity
	1.1.10	AARs/Group or Team Feedback
	1.1.11	Deployment/Combat Experience
	1.1.12	Role Modeling/Leading by Example
	1.1.13	Individual Developmental Feedback/Counseling/Mentorship
	1.1.14	Other Training Methods
	1.2	**Best Training Features**
	1.2.1	Repetition
	1.2.2	Incorporating Uncertainty
	1.2.3	Dealing with Stress/Pressure
	1.2.4	Difficult, Rigorous, Challenging Training
	1.2.5	Incorporating Problem Solving
	1.2.6	Setbacks or Unforeseen Hurdles
	1.2.7	Other Training Features
	1.2.8	Adverse Weather or Conditions
	1.3	**Worst Training Features**
	1.3.1	Focuses too much on qualifying
	1.3.2	Check the box training

	Theme #	Theme
Research Question 2: Measurement Characteristics that are Most Appropriate and How Measurement of Intangibles Can be Accomplished and Adapted to the Field		
	2.1	**Best Training Environment**
	2.1.1	FTX/STX Lanes
	2.1.1.1	Unit Level Training
	2.1.1.2	Platoon Level Training
	2.1.1.3	Squad Level Training
	2.1.1.4	Team Level Training
	2.1.2	NTC/JRTC/CTC
	2.1.3	Gunnery
	2.1.4	Resiliency Training
	2.1.5	CLS/MSTC
	2.1.6	Ranger/Mungadai
	2.1.7	Basic Combat Training
	2.1.8	Classroom Training
	2.1.9	PPT Slides
	2.1.10	OJT/On the Job
	2.1.11	PT / Fitness
	2.1.12	Combatives Training
	2.1.13	Other Training Environment
	2.2	**How is Training Currently or Best Evaluated?**
	2.2.1	AAR
	2.2.2	Instructor/Observer Controller
	2.2.3	Self-Evaluation
	2.2.4	Subordinate Evaluation
	2.2.5	Peer Evaluation
	2.2.6	Superior Evaluation
	2.2.6.1	First Line Leader (FLL)
	2.2.6.2	Unit Level/Commander
	2.2.6.3	Platoon Leader/Level
	2.2.6.4	Squad Leader/Level
	2.2.6.5	Team Leader/Level

	Theme #	Theme
Research Question 3: Training Performance Indicators for the Selected Intangibles		
	3.1	**Initiative Indicators**
	3.1.1	Knows responsibilities/takes or assumes responsibility/ownership
	3.1.2	Listens/Understands Big Picture/Commanders intent
	3.1.3	Anticipates what needs to be done
	3.1.4	Prepares for Next Step
	3.1.5	Effectively Uses Time
	3.1.6	Leads Peers
	3.1.7	Other - Initiative Indictor
	3.2	**Will Indicators**
	3.2.1	Persistence/How a Soldier reacts to adversity
	3.2.2	Lack of Complaint/ Can-Do Attitude
	3.2.3	Demonstrating a Will to Win
	3.2.4	Other - Will Indicator
	3.3	**Grit Indicators**
	3.3.1	Persistence
	3.3.2	Interested in learning other jobs
	3.3.3	Dedication to the Army
	3.3.4	Other - Grit Indicator
	3.4	**Hardiness Indicators**
	3.4.1	Persistence
	3.4.2	Other - Hardiness Indicator
Other Cross Question Themes		
	4.1	The source of intangibles is values or trait-based
	4.2	Not enough time/resources for training
	4.3	One or more of the intangibles seem related
	4.4	Intangibles can be tested at the same time